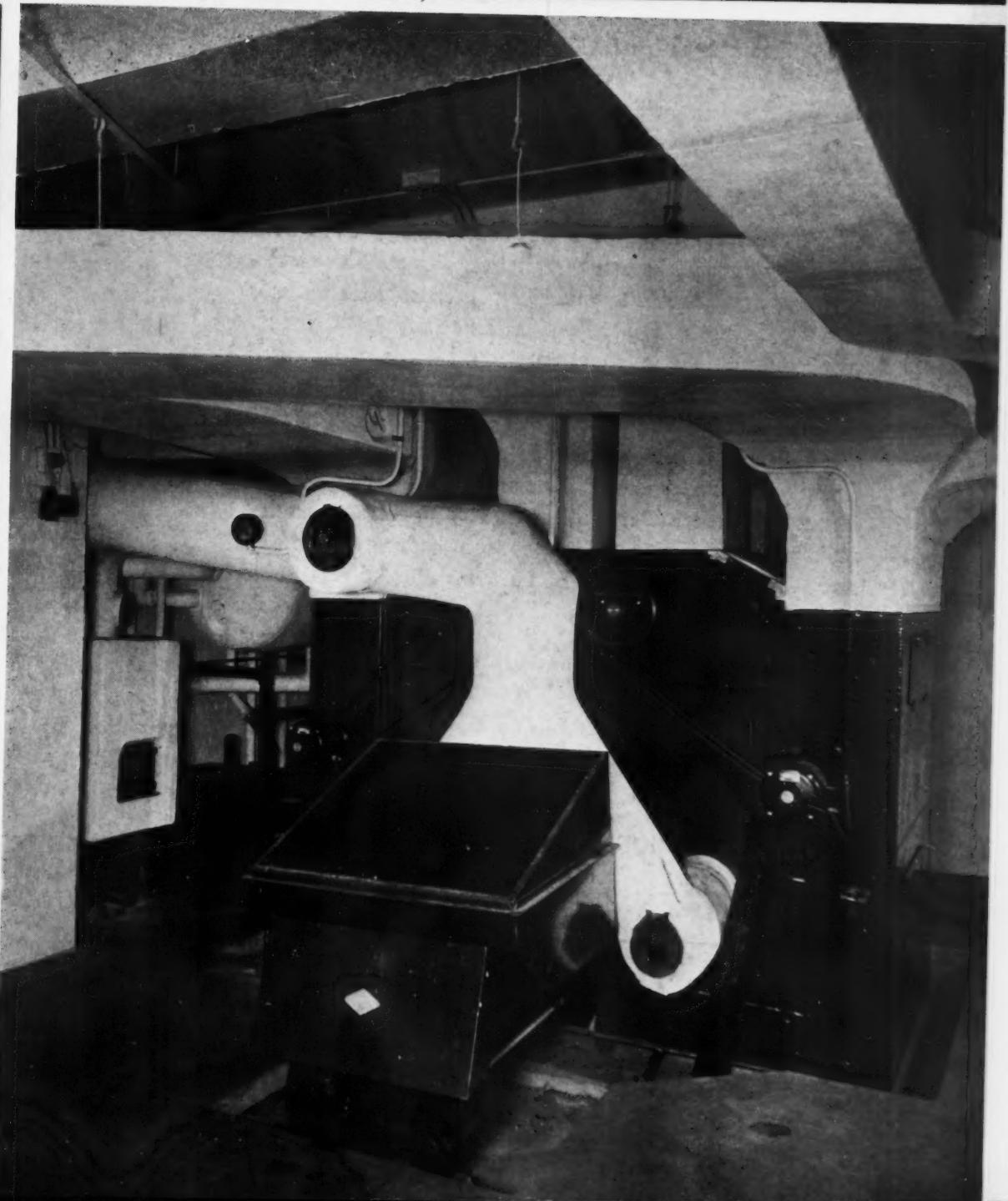


AMERICAN ARTISAN

RESIDENTIAL AIR CONDITIONING
WARM AIR HEATING • SHEET METAL CONTRACTING



1940
FEBRUARY

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G-55

LAMNECK Series 700 System

PREFABRICATED DUCT
AND FITTINGS

Assures Better Installation at Less Cost **PLUS** Predetermined PROFITS!

When you install a LAMNECK Duct System, you are definitely certain of a "swell job" and a satisfied customer. You get a system which operates at maximum efficiency. You cut out any possibilities of field failures. Follow the LAMNECK method in sizing your duct work to meet the limits of blower capacity.

The exact resistance of LAMNECK fittings have been accurately measured under practical conditions. These measurements are available to you. The predetermined standards of these fittings and their engineered accuracy will reduce your costs, satisfy your customer and bring you increased business.

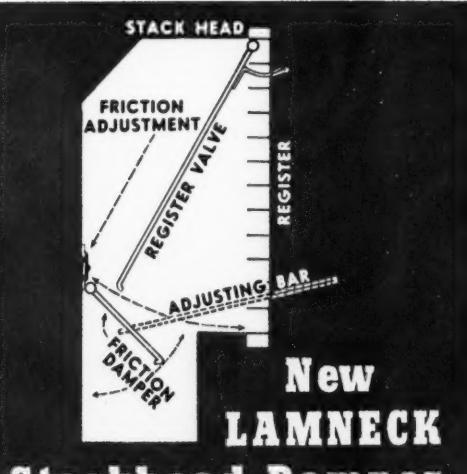
From your standpoint LAMNECK Series 700 Prefabricated Duct and Fittings hold the key to sure profits. You can figure your entire material costs from an easily engineered layout using the LAMNECK method. You can estimate big savings in installation labor costs, too, because of the ease and speed of assembling and installing each of these flexible and interchangeable fittings. Write today for the complete facts on LAMNECK Series 700 System Prefabricated Duct and Fittings.

Write for Name of Your Nearest Distributor

Specify
LAMNECK

LAMNECK PRODUCTS, Inc.

416-436 Dublin Ave., Columbus, Ohio



New **LAMNECK** Stackhead Damper

Before your next installation—check the savings you'll make by specifying LAMNECK Stackheads, containing an already assembled balancing damper. Compare its cost to you with the cost of your present stackhead, plus a quadrant damper in the basement. Don't forget to add the cost of making, assembling, and installing your basement damper. By comparison you'll find that LAMNECK'S Prefabricated Stackhead and Damper saves time, labor, and money. It makes possible a one-man job of "balancing." You can regulate the damper with the small adjusting hook illustrated above and at the same time you can check the results of your adjustment. It's adjustable without removing the register and once set, it stays put because of its friction lock.

It's tamper-proof, too, voiding the costly necessity of re-balancing your installation. It's a guard against construction dirt because it acts as a shield during plastering and finishing and does not become distorted, bent, or "frozen" after installation.

All in all, the LAMNECK Stackhead Damper offers every installation feature which assures you complete satisfaction. And best of all, it costs less than half of an ordinary installation.

When air is returned through stud spaces, it can be easily controlled by the use of a Lamneck Stackhead with balancing Damper.

For complete facts and details,
write today



PREFABRICATED DUCT AND FITTINGS FOR
ALL TYPES OF RESIDENTIAL WARM AIR
HEATING AND AIR CONDITIONING SYSTEMS

How YOU can figure and layout FORCED AIR SYSTEMS

- more accurately
- more quickly
- more easily
- more **PROFITABLY**

"Make it Practical" is the slogan for this year's course. Students will be given thorough and practical instructions in accurately figuring heat requirements of rooms, sizes of supply and return air ducts, etc., etc.

After learning in precise details, *how* all calculations are made, the students will be given more than 300 precalculated tables and shown how to use them for quick determination of heat losses, register air temperatures, c f m requirements and duct sizes.

**REGISTRATION FEE
For COMPLETE \$4⁰⁰
COURSE ONLY**

Rooms can be had in East Lansing homes near the college at \$1.00 per night per person (or at any hotel in Lansing) or in the Short Course Dormitory at \$3.00 for the course.

Meals are available at nearby restaurants or may be eaten with the Short Course Student Group at the M. S. Union for \$6.00 for 10 meals.

The total cost including Registration Fee need not exceed \$13.00.

ELEMENTARY COURSE in charge of Ross Walles, Chief Engineer of Meyer Furnace Co., will cover all details of the actual design of a system for a small colonial residence.

ADVANCED COURSE in charge of Gilbert W. Denges, Manager of Air Conditioning Division of Williamson Heater Company, will completely cover the design of a zoned system for a large residence which is located near East Lansing where it will be inspected by the students after the class work is completed.

COOLING SYSTEM DESIGN in charge of Walt Schlichting of Clarge Fan Co., will deal with all calculations and specifications of a cooling system for a small theater.



4 DAYS
MARCH
18
19
20
21

MAIL THE COUPON NOW

Prof. Lorin G. Miller,
Head, Dept. of Mechanical Engineering
Michigan State College
Lansing, Michigan

Yes
I hope to attend the
1940 PRACTICAL
short course March
18 to 21 inclusive, at Michigan State
College, East Lansing, Mich. I am
especially interested in:

Elementary Forced Air Heating
Course

Advanced Forced Air Heating
Course

Cooling Course

Please send me a copy of your complete program with the understanding that it does not obligate me in any way.

Name

Address

City & State.....

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in the interest of better Forced Air Heating

AMERICAN ARTISAN

WITH WHICH ARE MERGED

FURNACES
and
SHEET METALS

AND

Warm-Air
Heating

Covering All Activities in Residential Air Conditioning and Small Commercial Cooling, Warm Air Heating, Sheet Metal Contracting and Fabricating

J. D. Wilder, Editor

A. A. Kennedy, Assistant Editor

Vol. 109, No. 2

February, 1940

Founded 1880

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In This Issue

THREE important conventions are reported in this issue. On page 72 we highlight the National Warm Air meeting in which the liveliest discussion centered around ways and means of acquainting the public with the research knowledge established and ways and means of getting contractors interested as active members.

On page 76 we report the first annual convention of the new national association for sheet metal and allied contractors. This association is now established.

At the Illinois state convention (page 77) progress in the state licensing bill was reported and discussed. The program was also replete with practical addresses.

In December we presented one side of the high-side wall vs. baseboard register argument. We had hoped to present arguments in favor of the high-side registers in this issue, but the article is not quite ready.

But just to keep an argument going we publish on page 37 one engineer's views on the number and location of returns. Arguments one way or another are invited.

On page 45 we publish all necessary information on one of the outstanding installations of 1939. Originally scheduled for the January issue we did not get final data, but this system incorporates so many unusual ideas in design that we hope readers will study details.

Materials, generally, do not deteriorate because of inherent physical defects. Instead, they go to pieces, usually, because of improper application methods. The article on page 58 describing the failure of the roof at the Tomb of the Unknown Soldier is a case in point. The contractor, Lawrence Gichner, explains the improper original methods and the steps taken to insure the roof against future failure.

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More than 8,000 copies of this issue are being distributed



Solder and Sunday Dinner

by TIM SHEARS



I JUST picked up some swell dope on a big money contract for Monel pans. But just to show you how easy it is to make this kind of stuff let me tell you what one of these home workshop fans did.

He's a nut on "soilless plant growth" and makes up a couple of small tanks to hold these new-fangled chemical gardens. "I curved some 12 inch squares of Monel sheet over a piece of soil pipe, for the bottoms," he tells me. "For right angle bends on the ends I clamp the metal between two pieces of wood with good square edges."

"It was easy as pie to work the Monel," he goes on, "but I'm a bit leary about doing the soldering... especially using the kitchen range on Sunday morning." "Well," I cuts in, "all you do is tin the Monel where you're going to solder it." "Too much trouble," he comes back, "I cleaned it good with emery cloth and started right in."

Then the guy's eyes light up. "Boy!" he chirps, "Is that Monel a cinch to solder! I warmed it up on the gas then just touched a piece of acid core solder to it. That solder flowed right around the seam as smooth as cream. Only one trouble," he adds, "while I'm working on the range, the wife keeps right on cooking the dinner."

Of course, making pans like those in the picture you don't



This pile of pans represents a pile of profit for the contractor who did the job. Made of 20 gauge Monel sheet, electric welded, size 24" x 36" x 1½". (Below) It's easy to weld Monel trays either electrically or by gas.

use soft solder. These pans took 5,000 pounds of Monel sheet and were electric welded. Here's how you make 'em:

First: Notch the corners out on a die. Then, while the sheet's still flat, curl the four edges ready to put wire in to stiffen the trays.

Second: Bend up the four sides on a press brake (a sectional sheet metal brake will do as well). Set Monel wire in the recess then roll the edge of the metal over it.

Third: Electric weld the corners using .075 inch or 3/32 inch Monel metallic arc welding rod on reversed polarity. And make it snappy on the welding, when you're working on light-gauge metal.

Fourth: Grind and polish the welds if you have to...which you don't on lots of industrial jobs.

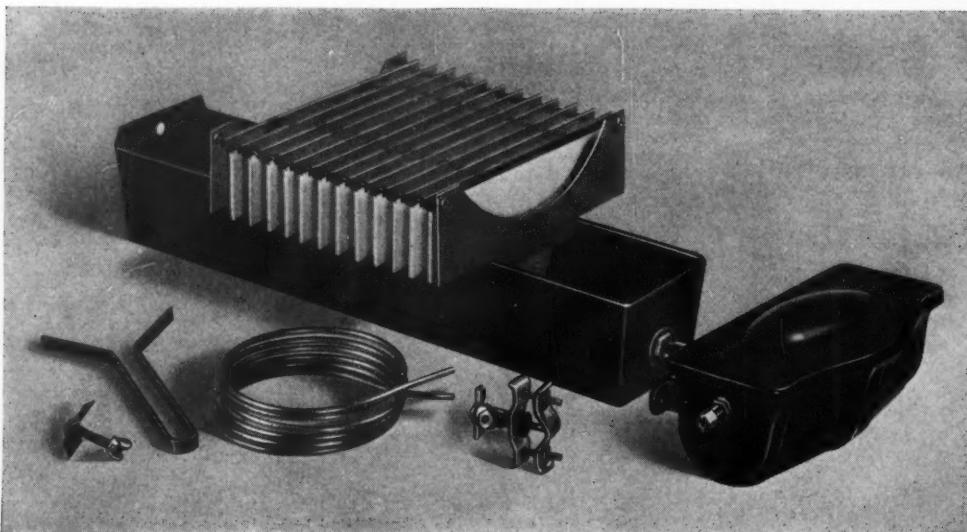
I've seen plenty of jobs like this where gas welding was used instead of electric. It's simple to do on Monel, Nickel or Inconel. Just see that your flame is what they call "slightly reducing." You'll know when it is because you get a bit of a feather about a 1/16 inch long. Make sure your jig has a good hold on the metal. For some real dope on welding you ought to read our bulletin T-2, "Gas Welded and Brazed Joints for Monel, Nickel and Inconel." Drop me a line and I'll see that you get it by Mr. Farley's express.

TIM SHEARS

THE INTERNATIONAL NICKEL COMPANY, INC.
67 Wall Street
New York, N. Y.

"Monel" is a registered trade-mark of The International Nickel Company, Inc., which is applied to a nickel alloy containing approximately two-thirds nickel and one-third copper.

480 square inches of evaporating surface



on this new VIKING humidifier

Here is Viking's answer to the need for a compact unit that fits into minimum space, yet provides adequate evaporation. Practical for all types of furnaces—it can be fitted into warm-air plenum chambers, ducts, and small casings. Particularly effective in the lower temperatures of forced-air systems since evaporation is greatly increased by moving air passing over saturated "fins."

The Viking Series 1100 is a 2-unit humidifier consisting of evaporating pan and separate float chamber located outside the furnace where it is easily accessible and away from heat and mineral deposit. Evaporating pan, with two coats of porcelain enamel and 12 "Pyroxene" plates, provides 480 sq. inches of evaporating surface. Package includes complete set of fittings.



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BLOWERS . . .
HUMIDIFIERS

Write for literature describing the complete line of VIKING humidifiers and other products.

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VIKING AIR CONDITIONING CORPORATION

RYBOLT

ANNOUNCING THE Gasmaster

THE NEW RYBOLT STEEL GAS-FIRED WINTER AIR CONDITIONER

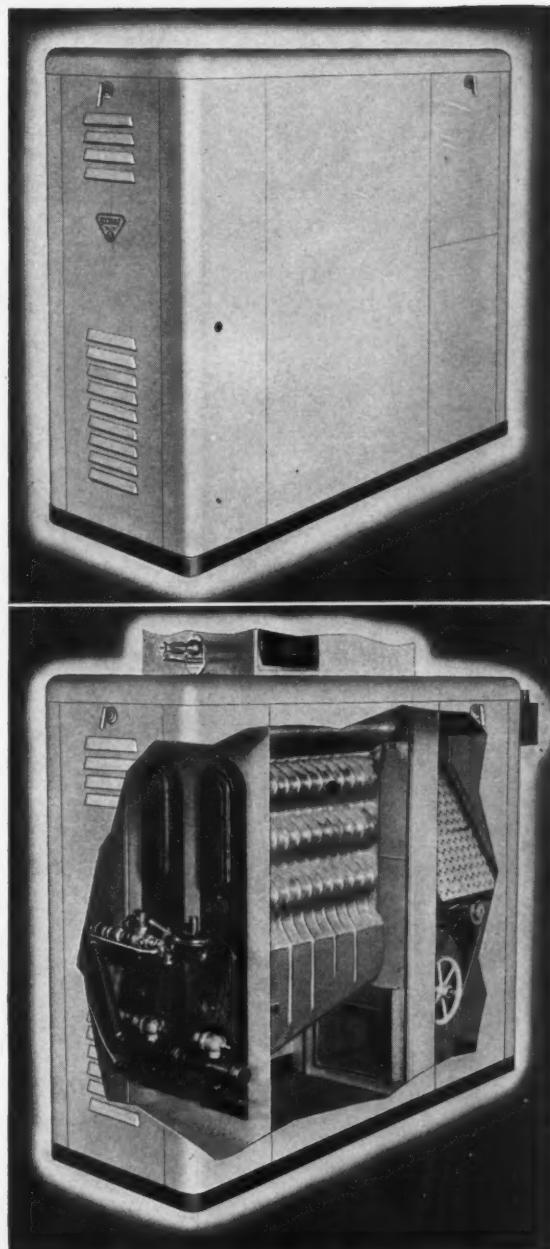
For those customers of yours who want the cleanliness, convenience and comfort of gas-firing, with real fuel economy, here's a dependable new RYBOLT unit that has everything!

Complete with automatic control, automatic humidifier, quiet running centrifugal type blower and specially designed burner with Baso automatic shut-off, the GASMASTER is a marvel of quiet, efficient and trouble-free performance.

Heating elements and casing areas are scientifically proportioned to assure even distribution of air over all heating surfaces. The casing is ingeniously baffled and interlined so that cool return air passes between inner lining and outside casing. This keeps the cabinet surface cool and protects the finish.

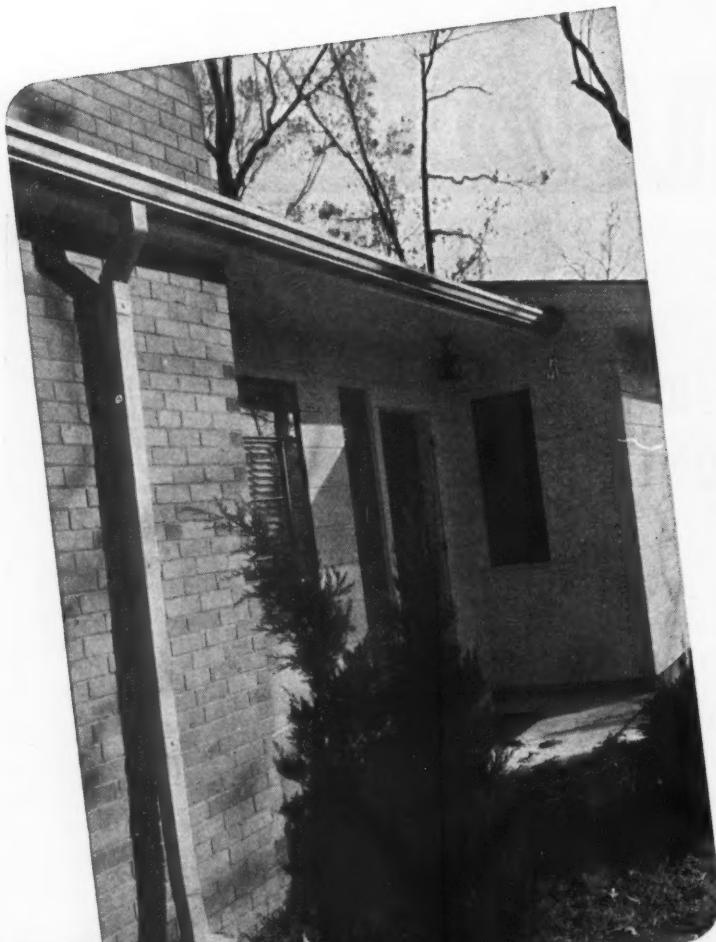
Compact in size, attractive in design and handsome in its finish of smooth, gray Hammerloid, chromium trim and black base, the GASMASTER has instant and smashing sales appeal.

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Folder and Prices*



THE RYBOLT HEATER COMPANY
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2—Stainless steel is strong. Properly installed, it will not crack from expansion and contraction; nor will it sag dangerously or pull apart between supports under heavy snow loads. Being *stainless* it will not discolor adjacent surfaces.

3—ARMCO Stainless Steel has excellent workability in the recommended gages, enabling you to form roof drainage parts quickly and easily on regular shop equipment. This speeds the work and assures a job true to specifications.

4—Stainless steel compares favorably in price with other high-grade roof drainage metals; and labor costs are no more. Its great durability and freedom from upkeep appeal strongly to architects and owners.

For prices, quick deliveries and specific installation data, call the nearby ARMCO Distributor or write us direct. The American Rolling Mill Company, 561 Curtis Street, Middletown, Ohio.



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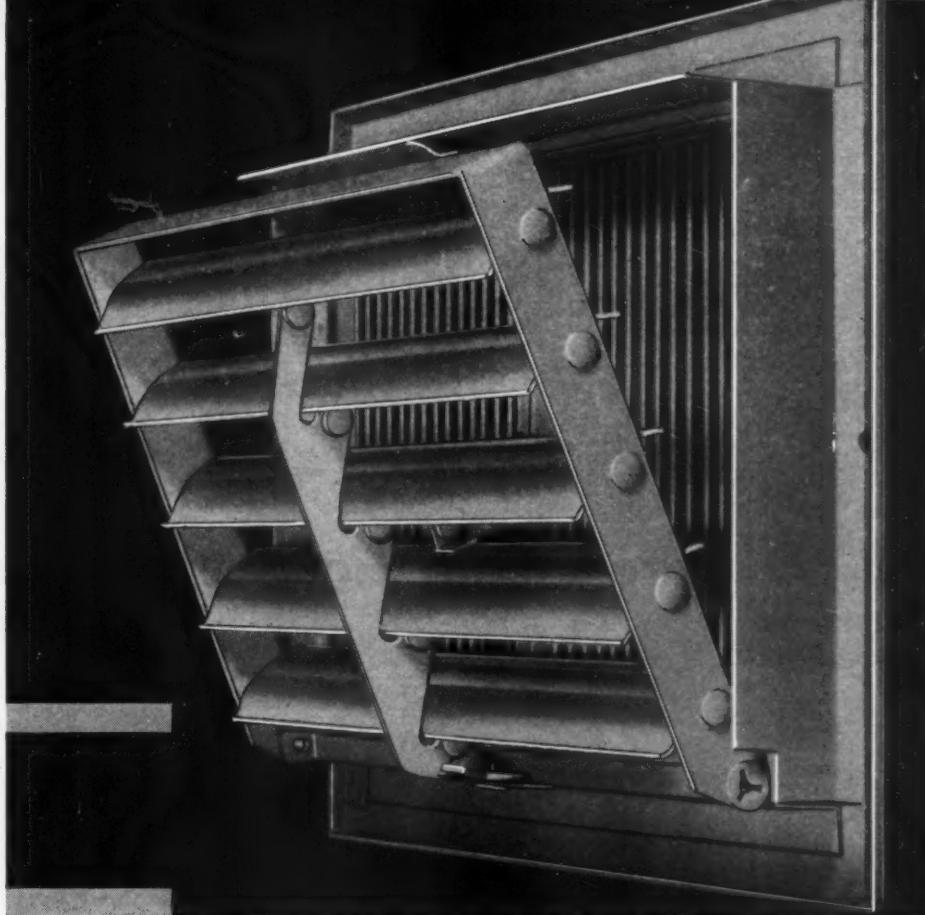
STAINLESS STEEL

A MODERN METAL FOR AN OLD USE

NO WONDER
THEY'RE SO
POPULAR-

H & C REGISTERS
with
**TURNING BLADE
VALVE**

IT NO EXTRA COST!



ALTHOUGH placed on the market less than a year ago, H & C Registers with Turning BLADE VALVE are recognized as today's OUTSTANDING VALUE. A glance at the chart below shows why!

PERFORMANCE CHART

QUESTIONS	Registers (Vertical Bar) with SINGLE SHUTTER VALVE	Registers with Conventional MULTI-SHUTTER VALVE	H & C REGISTERS with TURNING BLADE VALVE
1. Will they completely stop the Air Flow when closed?	YES, if well made.	YES, if well made.	YES, and with no chance of objectionable noise.
2. Will they direct the air flow up—straight—down?	NO. Possibility of streaked ceilings.	YES.	YES, with a minimum of effort.
3. Will they increase or decrease turbulence?	INCREASE—see cut. 	INCREASE—see cut. 	DECREASE—see cut.
4. Will they increase or decrease resistance?	INCREASE (Turbulence adds resistance)—See above.	INCREASE (Turbulence adds resistance) See above.	DECREASE—(Actually less resistance than without stack-head.) See above.
5. Is air flow even over entire face?	Obviously NO. See cut above.	Obviously NO. See cut above.	YES—proven conclusively.
6. How about size required?	Oversize necessary. (Only part of face is used.)	Oversize necessary. (Only part of face is used.)	Oversize register not required. (ALL of face is used.)
7. HOW ABOUT COST??	CHEAPEST.	Only slightly more than single shutter valve.	Same as Multi-Shutter Valve, size for size. BUT SMALLER SIZES CAN BE USED.

YOU ACTUALLY PAY NOTHING EXTRA FOR THE H & C TURNING BLADE VALVE

HART & COOLEY MANUFACTURING CO.

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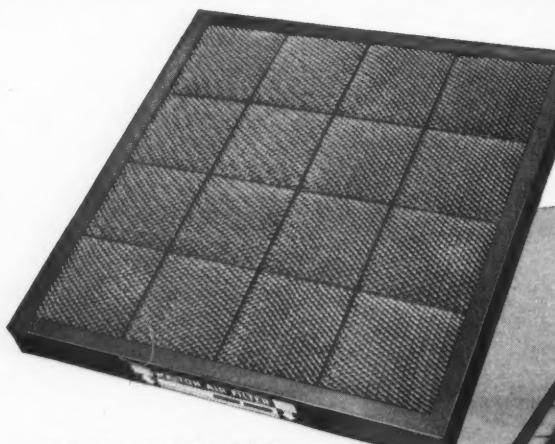
Dealers Like

WALTON AIR FILTERS

Because They

STOP MORE DUST—HOLD MORE DUST

... are Clean; Lightweight; Odorless; Safe and Easy to Handle in Replacing...



*Walton Standard, Type WS Filter.
Illustrated above*

Furnace dealers know that satisfied customers result only from the performance of the furnace they sell. Therefore, the matter of the simple, easy replacement of a more efficient filter, at a lower service cost to them, is vitally important.

We know that Walton Air Filters offer dealers the best replacement filter proposition from both his and his customer's viewpoint. Here is why:

1 Every square foot of Walton Air Filters holds at least 150 grams of standard dust which is about $\frac{3}{4}$ lb. per standard sized filter.

2 Walton Air Filters are made of twenty-two sheets of heavy, flame-proofed fiber that are slotted and expanded into honeycomb patterns of various size.

3 These sheets are so assembled that no two air passages are parallel. The sections are bound together into one compact unit.

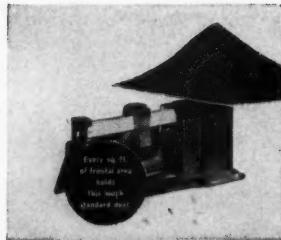
4 A special non-drying, odorless non-dripping adhesive is applied to each section with the heaviest impregnation in the center. Because of this heavy impregnation, no adhesive is carried into the air system. The adhesive is very efficient in holding dust, re-

gardless of temperature under which the filters are operated.

5 The adhesive is clean and odorless. It does not soil. Because the entire filter is made of tough, heavy fiber, no particles break off, therefore they are easier and safer to handle.

6 Because the air passages in the twenty-two sheets are not parallel, the air, in passing through a Walton Air Filter travels a circuitous route, reversing itself twenty-two times, thereby stopping and holding more dust particles.

More and more of the better air conditioning furnace manufacturers are adopting Walton Air Filters as standard equipment. Their better performance and economy are the reasons. Call this to the attention of your prospects. It will help you sell units equipped with Walton Air Filters. Write for literature.



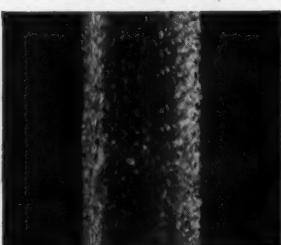
1 Holds More Dust



2 Patented Slotted Sheets



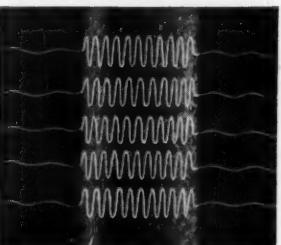
3 Twenty-two Separate Sheets



4 Non-Drying Odorless Adhesive



5 Clean and Easy to Handle



6 Twenty-two Reversals of Air

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High capacity, long lasting, low cost mineral for softening water.

• FILTERAG

An efficient filter medium for filtering water and liquids.

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A carbonaceous cationic exchanger for removing alkalinity from water.

• BIRM

The effective, inexpensive mineral for removing iron from water.

• AIR-FILTERS

Made of expanded fibre, high dirt removal efficiency, low resistance to air flow.

A SIMPLE CURE FOR AIR CONDITIONING HEADACHES

A MESSAGE OF VITAL IMPORTANCE TO DEALERS AND CONTRACTORS



● At last a simple, practical plan of shop training is available to the man in the heating business who is reaching out for a broader market opened by air conditioning. Without preliminary study you can get the actual shop and field practice necessary to bring yourself up-to-date in this rapidly expanding new industry in a short time and at low cost. You can work on all kinds of modern equipment and learn about new applications, new products and new merchandising ideas which will help you to stay in business and earn a profit. You can take this training a week at a time—and take only the subjects in which you are interested.

● You will learn all about warm air heating and air conditioning systems, including engineering fundamentals, job engineering and estimating. New classes begin work every Monday morning. No preliminary study is required. You learn by doing, under the guidance of trained instructors. You don't waste a minute in getting to work.

● This training program is recommended to you by such outstanding authorities as J. H. Manny, President, Robinson Furnace Company; John Norris, Vice-President, Lennox Furnace Company; Thomas Torr, Chief Engineer, Rudy Furnace Company; and others equally as well known in the warm air heating field.

● Look at the outline of subjects covered at right. Note the completeness of the training provided. Decide to become an expert in your industry. Write today for prospectus and complete details about the most progressive and practical training ever created.



Instruction in operation of pneumatic and electrical control systems used in warm air heating

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INDUSTRIAL TRAINING INSTITUTE
Since 1916
2130-2158 LAWRENCE AVENUE • CHICAGO, ILLINOIS

SOME SHEET METAL WORKER WILL MAKE A NEAT PROFIT

*out of this sheet of
U·S·S
Stainless Steel*



... AND IT MIGHT
AS WELL BE
YOU!

SHEET metal men tell us that the biggest thing that's happened in a long time is "Stainless Steel." In hundreds of instances, they have been able to give a customer a better, longer-lasting job for his money and at the same time turn in a better profit. And since stainless installations always remain so bright and attractive, each job stands as a permanent advertisement for craftsmanship, often bringing in new business from unexpected sources.

Opportunities for work done in

U·S·S Stainless Steel are almost without limit. Hotels, restaurants, clubs and hospitals are equipping their kitchens with this sanitary metal. Marquees, store fronts, building entrances are being made more attractive with this easy-to-clean architectural trim. In factories and industrial plants there are frequent calls for stainless sheet work. And nearly every home is a prospect for a stainless kitchen and other accessories.

To get your share of this profitable business, all you have to do is put

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UNITED STATES STEEL

NEW

**NO.
1521A**

INDEPENDENT "Fabrikated"

(Reg. U.S.
Pat. Off.)

ADJUSTABLE DIRECTED AIR FLOW REGISTERS

High Quality but Not High Priced

- The latest addition to the extensive "Fabrikated" line, which has been growing steadily in favor for many years. Vertical grille bars, adjustable in groups, give right or left or straight outward direction of air flow. May be adjusted before or after installing. Strong, rigid and fine appearing.

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Favorably Priced

*to make genuine
"Fabrikated" construction
available to a wider market*



Showing Horizontal Multiple Valves; adjustable to direct the air flow either straight outward or up or down. They may be entirely closed from any position. Control screw for setting the valves for directional flow is located out of sight near operating lever. *Not easily tampered with.*

THE INDEPENDENT REGISTER CO.

3747 East 93rd Street • Cleveland, Ohio

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**TRIPLE YOUR
PROFIT**
ON THERMOSTAT
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- Minute-Meter Clock
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MINNEAPOLIS H

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New PERFORMANCE

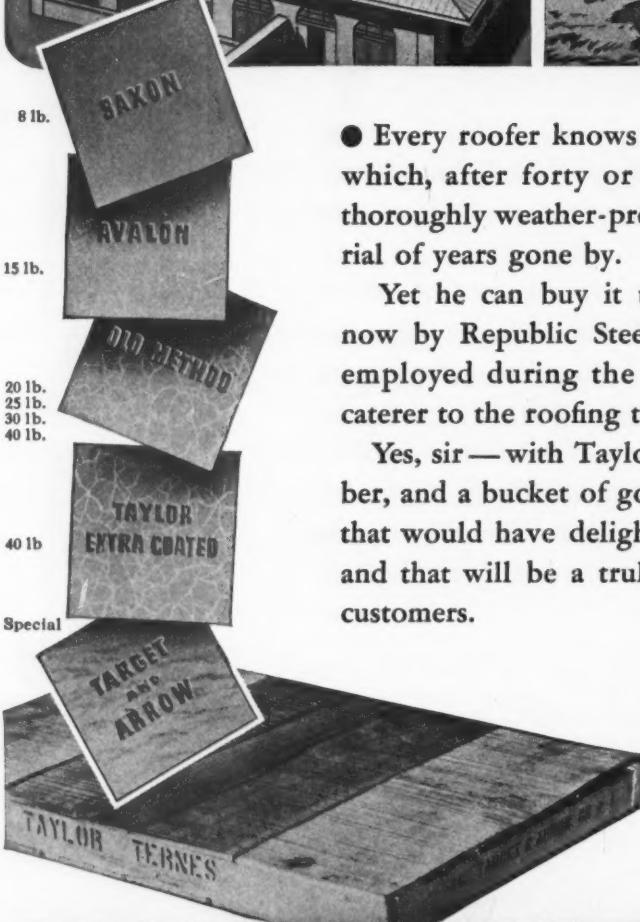
28 3/4 %

LOWER IN PRICE

WITH justifiable pride we give you the 1940 Minute-Meter Chronotherm. Its smart, handsome appearance — its new, easily read numeral clock and its superb performance will make every one of your customers want this new instrument. But wait! The 1940 Minute-Meter Chronotherm lists at only \$18 more than a plain pattern thermostat. It eliminates the bother and expense of service calls. And the sensationaly low price puts the Chronotherm within reach of everyone. Compare the Minute-Meter Chronotherm with last year's model. Then see the many improvements in design and performance. Order one or more today and get absolutely free a handsome electric display. We know you will be as proud of the 1940 Minute-Meter Chronotherm as we are.

Minneapolis-Honeywell Regulator Co., Minneapolis,
Branch and distributing offices in all principal cities.

IS HONEYWELL



● Every roofer knows of old roofs made with good terne plate which, after forty or fifty or more years of service, are still thoroughly weather-proof. And he yearns for the good old material of years gone by.

Yet he can buy it today — the famous Taylor Ternes made now by Republic Steel Corporation with the same artisanship employed during the nineteenth century by that well-known caterer to the roofing trade — N. & G. Taylor Co.

Yes, sir — with Taylor Ternes, obtainable from your local jobber, and a bucket of good linseed oil paint, you can build a roof that would have delighted the shrewd builder of a century ago, and that will be a truly equally economical one to your present customers.

Made in five grades and in several weights of coating. Write for detailed literature to Republic Steel Corporation, General Offices, Cleveland, Ohio.

BERGER MANUFACTURING DIVISION • NILES STEEL PRODUCTS DIVISION
STEEL AND TUBES DIVISION • UNION DRAWN STEEL DIVISION

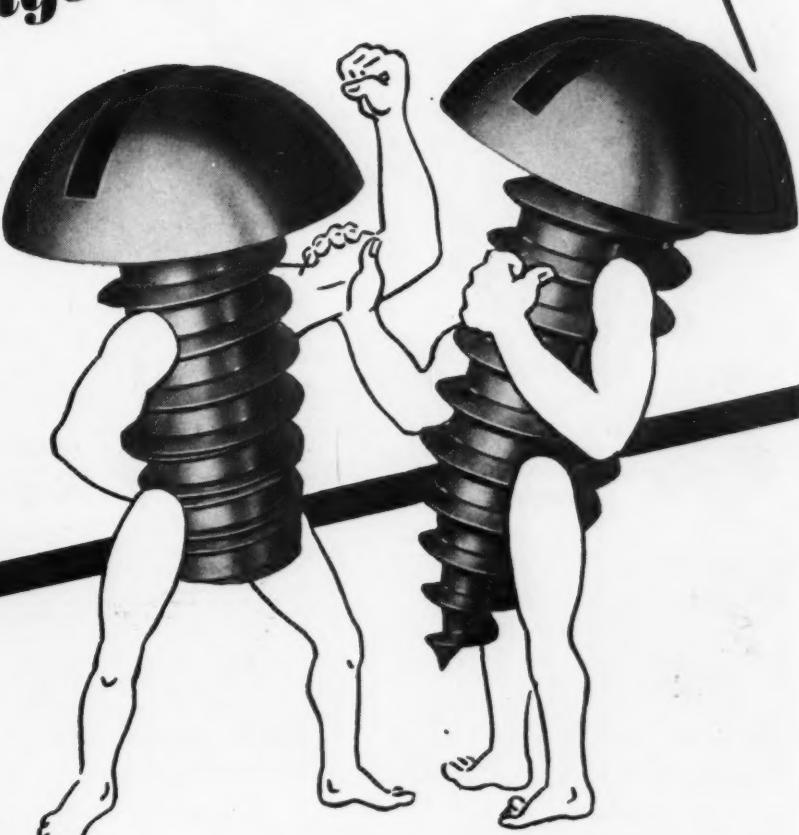
TRUSCON STEEL COMPANY



Republic TAYLOR ROOFING TERNES

*"We make stronger,
better fastenings every time . . ."*

**WE'RE GENUINE
SHEET METAL
SCREWS!"**



TODAY sheet metal contractors can't afford to bother with "temperamental" screws—the kind that look good in the box but fail on the job—the kind that run up trouble and expense necessitating frequent replacements—the kind that manage to hold up the work. That's one big reason why more than 40,000 shops stick to Parker-Kalon Sheet Metal Screws—for only the genuine give genuine fastening economy!

No fussing with Parker-Kalon Screws on the job! Because of uniform accuracy and full threading to the head, these screws go in easily, straight, and hold every time. These screws have threads that don't strip and heads that don't twist off. Result—stronger, better fastenings in less time . . . the only kind that pay a profit.

Order Parker-Kalon Screws today . . . by name . . . and prove this superiority for yourself!

PARKER-KALON CORP., 200 Varick Street, New York, N. Y.

4 REASONS WHY YOU CAN DEPEND ON PARKER-KALON SHEET METAL SCREWS

1. **UNEXCELLED LABORATORY FACILITIES** . . . the Parker-Kalon Laboratory which controls and maintains the high standard of quality for which Parker-Kalon Screws are so widely recognized, represents an investment of over \$250,000.
2. **SPECIALIZED PRODUCTION EQUIPMENT** . . . is required to produce Parker-Kalon Self-tapping Screws and to maintain their uniformly high quality. The Parker-Kalon plant is famed as the most up-to-the-minute in the industry.
3. **FREE ENGINEERING SERVICE** . . . to help designers and production men obtain better fastenings at lower cost. Available throughout the country, Parker-Kalon Assembly Engineers render free service to both users and prospective users of Parker-Kalon Self-tapping Screws.
4. **AVAILABLE EVERYWHERE** . . . no matter where your plant is located there is a reputable supply house distributing Parker-Kalon Screws . . . assuring you a dependable source of supply.

PARKER-KALON Sheet Metal Screws

SOLD ONLY THROUGH RECOGNIZED DISTRIBUTORS



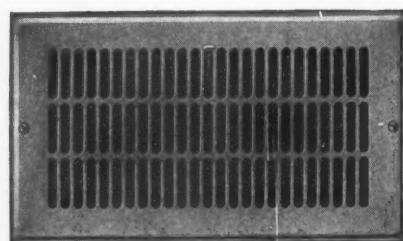
AUER
provides a
COMPLETE
Line of Registers

for All
 Air Conditioning
 & Gravity Uses!

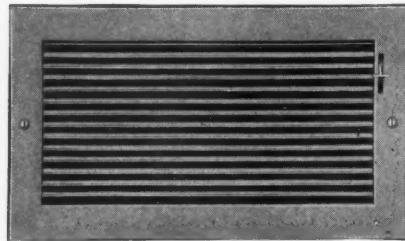
Save time and trouble by selecting a complete, reliable register line and sticking to it. We offer you, in Auer Registers and Grilles, a comprehensive line for *all* your needs, including latest air directional designs. Auer quality, value, and service are unexcelled. To try Auer is to buy Auer! Why not get the habit?

DuraBilt Register

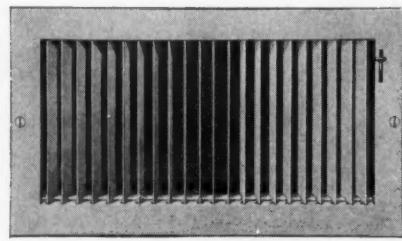
New 4-Way Directional Airo-Flex Register to be Announced Soon!



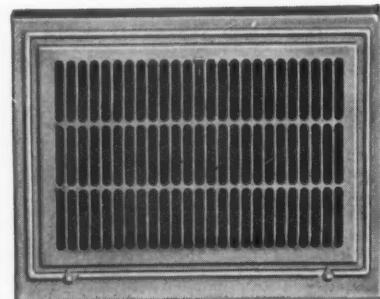
2030 CLASSIC Wall Register



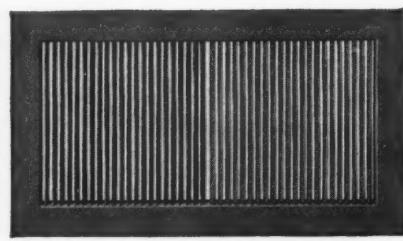
5030 Fin-Flex Register



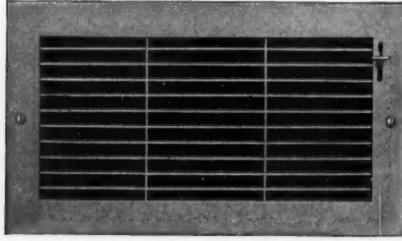
8130 Dura-Flex Register



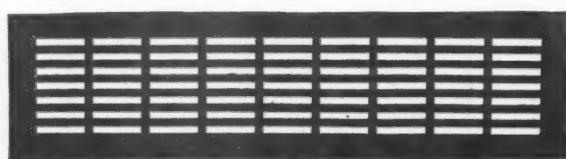
600 Elite Two-Piece Register



9000 Fin-Flex Grille

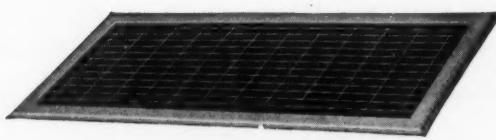


8530 Dura-Flex Register



31A Grille

Consult your
 jobber—or
 write us direct
 for Auer Reg-
 ister Book 40A,
 illustrating all
 models.



DuraBilt Cold Air Face

THE AUER REGISTER COMPANY, 3608 PAYNE AVENUE, CLEVELAND, OHIO

AUER DISTINCTIVE **REGISTERS**
 & GRILLES  For Air Conditioning and Gravity

**"A FINE TIME FOR
THAT TO HAPPEN...
*but Scully can help us out!"***



"An order for one bar of alloy was 'phoned Saturday after closing hours. A truck was broken down on the highway. By special handling the bar was ready for the customer within 10 minutes after his messenger arrived at our Newark warehouse."



WE don't keep our warehouses open day and night—but you can always get a Scully man on the phone at the office or at home. When emergencies occur we do everything within our power to meet the situation promptly and efficiently.

However, it's regular orders, not emergency orders, that make up the

bulk of our business. What about them? Does Scully Service function as well as with rush orders? We'd be glad to have you ask any of our thousands of customers. Scully Service is built upon the principle that our customers *always* want immediate shipment and friendly contacts. No matter how large or how small your order may be, it will get

the same treatment. Each of our eight conveniently located warehouses operates on this principle—and we always hurry, whether you ask us or not.

If you're not one of our customers now, why not call Scully the next time you need steel, steel products, copper or brass? And ask for a free copy of our 1940 Stock List and Reference Book.

The Mark of Quality



The Mark of Service

SCULLY STEEL PRODUCTS COMPANY

Distributors of Steel, Steel Products, Copper and Brass

*Warehouses at CHICAGO • NEWARK, N. J. • ST. LOUIS • BOSTON
ST. PAUL-MINNEAPOLIS • CLEVELAND • PITTSBURGH • BALTIMORE*

UNITED
STATES
STEEL

DESIGN ✓ MANUFACTURING METHODS FINISHED MOTOR

Make that second factor your deciding factor

Look to excellence of design, to suitable electrical and mechanical characteristics—as factors that determine what motor you specify for industrial use. But also look *within* the motor, to the methods by which it was manufactured.

Delco Products has taken full advantage of General Motors research and engineering facilities in the development of precision manufacturing methods. Specially-built machines designed by

Delco Products engineers and General Motors engineers control tolerances and build into every Delco motor the long life and freedom from service trouble that industrial use demands.

Delco Products' precision manufacturing represents the all-important link between *designed* and *actual* performance. Consult the Delco Products Engineering Department when selecting electric motors for your equipment.

Laminations in Delco stator cores are stamped out by a multiple-slot die, and the completed core is accurately ground on the outside, concentric with the end-frame register. Specially-built machines are used for this operation.



Delco industrial A.C. motors are available in various types, possessing electrical and mechanical characteristics to meet practically every requirement. Each type available in open-frame, sleeve or ball bearing—totally enclosed ball bearing—totally enclosed fan-cooled ball bearing—also multi-speed motors. Electrical and mechanical modifications available. Delco motors comply with NEMA standards.

DELCO  **MOTORS**
DIVISION OF GENERAL MOTORS CORPORATION

BUYERS GUIDE TO AUTOMATIC GAS HEAT



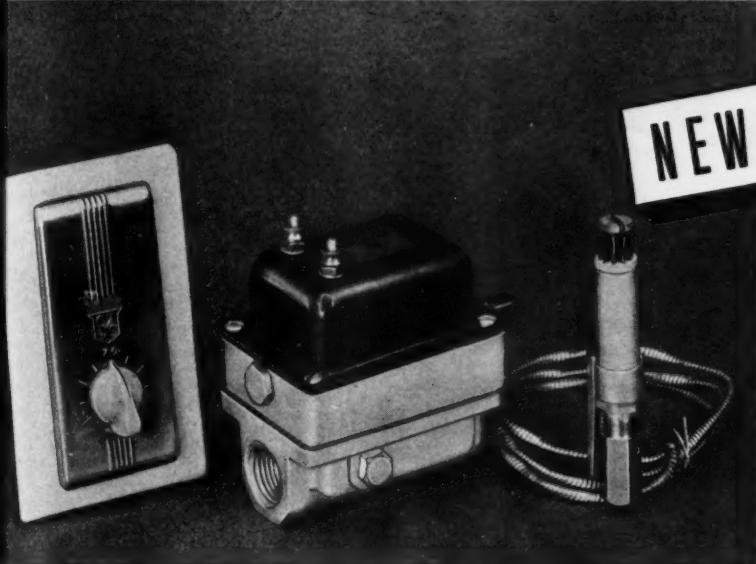
GENERAL CONTROLS GAS HEATING PACKAGE SETS

...They're just right!

**THE MOST VERSATILE, POPULAR AND LOGICAL LINE OF
AUTOMATIC GAS HEATING CONTROLS FOR RESIDENTIAL,
COMMERCIAL AND INDUSTRIAL INSTALLATIONS**

B-60-6 GAS HEATING PACKAGE SET WITH REMOTE OR INTEGRAL THERMOSTAT

For space heaters, gas-fired steam radiators, wall and radiant heaters, range heaters, floor furnaces, etc.



These amazing and versatile *all-gas actuated* controls are the newest and most modern of General Controls' gas valves. Remember, no electricity is needed; these valves generate their own current. Valves are silent, safe and 100% positive in operation. This popular set includes a new B-60 gas valve, pilot generator, remote room thermostat, or thermostat integral with valve.

T-30 GAS HEATING PACKAGE SET

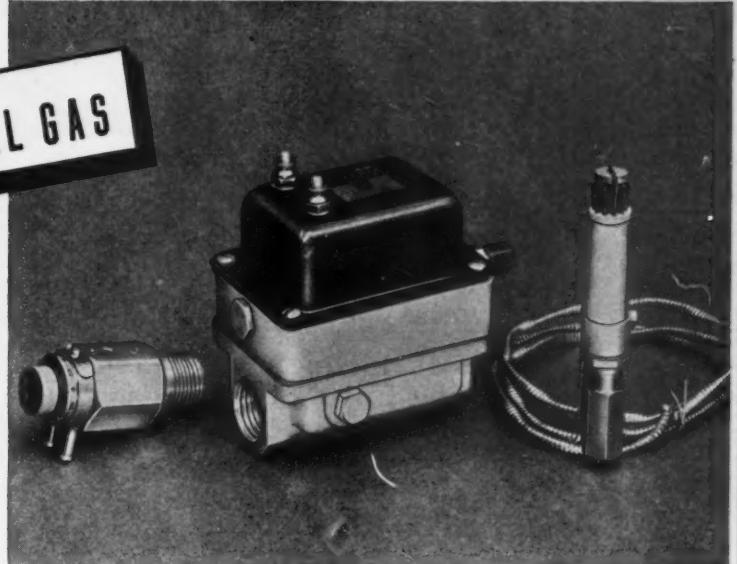
For gas-fired boilers, conversion burners, floor furnaces, warm air, blower and gravity furnaces.



This is the popular General Controls T-30 Gas Heating Set. It includes a silent Type K-3B two-wire gas valve, a T-70-1 attractive two-wire Metrotherm, transformer and 30 feet of wire. Available with night shut-off. Thousands of installations proved that they're easy to buy, easy to sell, easy to install. In fact, *they're just right!*

B-60-6 GAS HEATING PACKAGE SET with TANK THERMOSTAT

For automatic, sensitive and visible control of water heaters.



In water heater installations, the compact, sensitive tank thermostat mounts in side of tank, permitting wiring to be brought up through the heater casing, making a streamlined installation. The gas valve is installed under the heater. Setting knob on thermostat provides easy adjustment. No noise of any kind, starting, stopping or operating. Pilot generator acts as ideal safety pilot. The set includes B-60-6 valve, pilot generator and tank thermostat.

WRITE FOR CATALOG

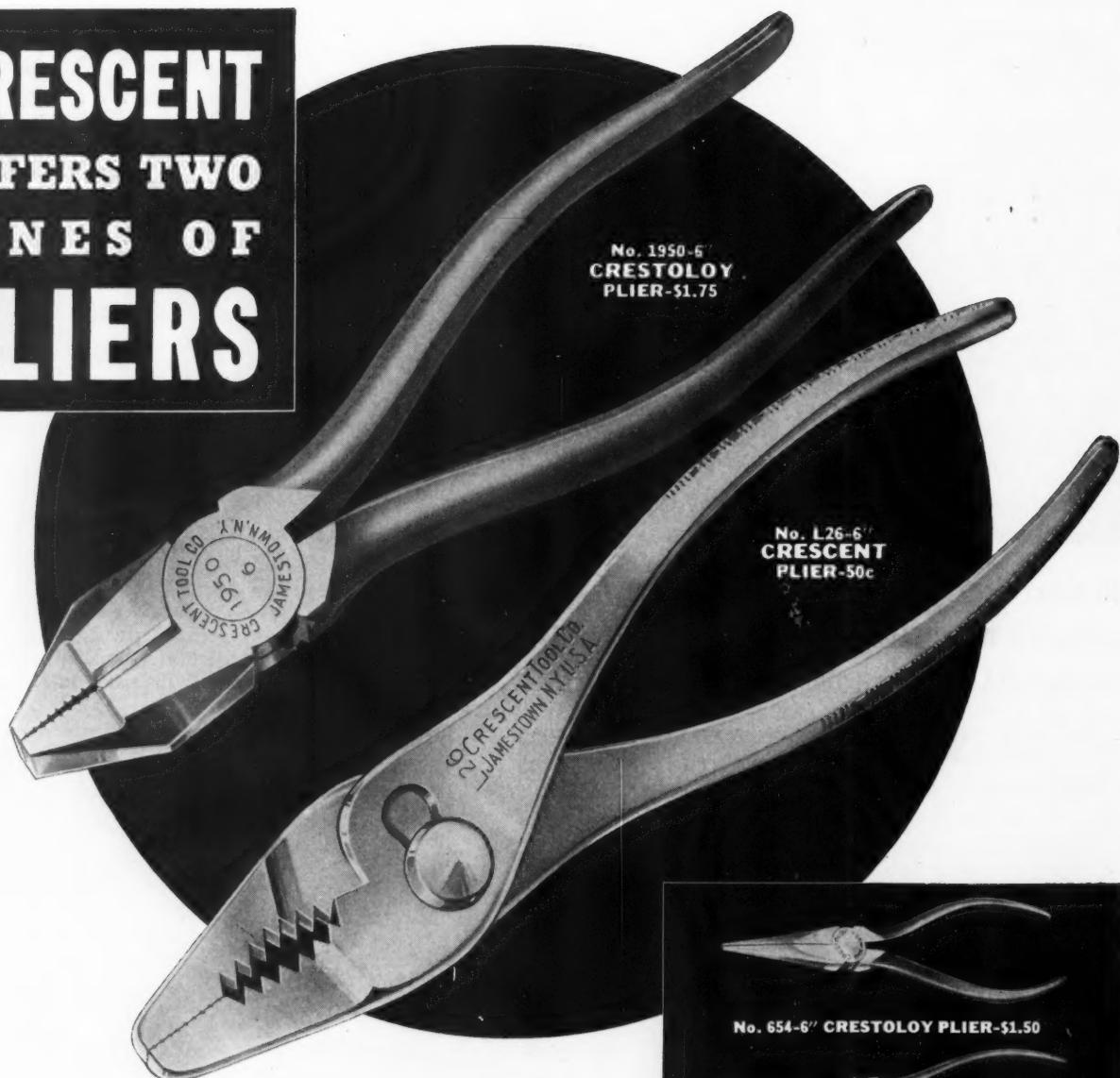
GENERAL CONTROLS

450 East Ohio Street, Chicago, Illinois • 25 North Live
Oak Street, Houston, Texas • 1505 Broadway, Cleveland,
Ohio • 3626 Wyoming Street, Kansas City, Missouri



915 Bryant Street, San Francisco, California • 267 Fifth Avenue,
New York City • 700 West Ivy, Glendale, California • 6432 Cass
Avenue, Detroit, Michigan • Distributors in all principal cities

CRESCE NT OFFERS TWO LINES OF PLIERS



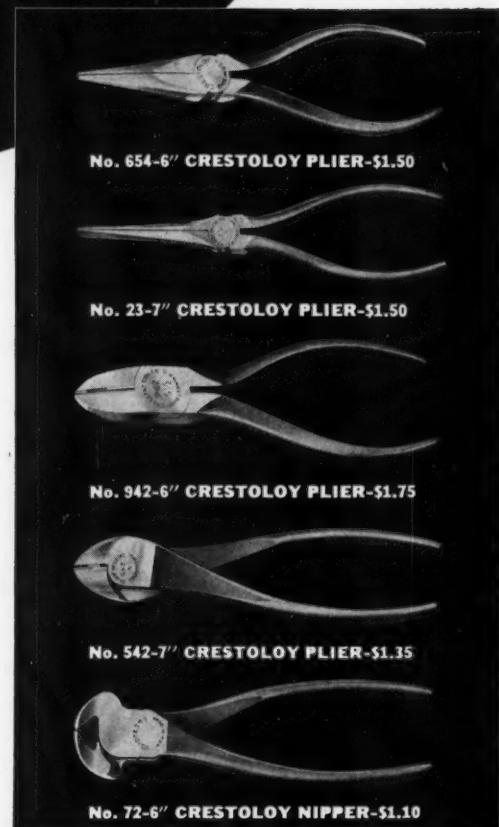
Crescent manufactures two distinct lines of pliers —each comprising a wide variety of popular and many special patterns.

"Crestoloy" Pliers have established an entirely new standard of tool excellence. These fine pliers, with their lighter, trimmer lines, are forged from Crescent's own special steel. They are individually tested and tagged. No finer pliers are produced commercially.

"Crescent" Pliers, drop-forged from a special-analysis steel, are carefully machined and represent a high grade of workmanship. They are available in a variety of slip-joint and miscellaneous types.

Both lines are fully guaranteed.

CRESCE NT TOOL CO., JAMESTOWN, N. Y.



CRESCE NT and Smith & Hemenway TOOLS

OPPORTUNITY KNOCKS 3 TIMES

for G-E Dealers



(1) HEATING



(2) AIR
CONDITIONING



(3) COMMERCIAL
REFRIGERATION

**G-E gives you something to sell prospects
... EVERY month in the year!**

PROFITS

...from Heating



PROFITS from warm air heat... built to sell—a full line of oil and gas winter air conditioners that heat, filter, humidify and circulate. This offers you profits from duct work, too.



PROFITS from split systems. The last word in automatic, conditioned heating that is now enjoying such popularity—controlled warm air heat plus winter air conditioning. Plus a prospect for adding summer cooling at any time.

PROFITS from advertising and dealer promotion. National magazine plus cooperative newspaper advertising of your products, in your territory, reaching

PROFITS

...from Air Conditioning



PROFITS from home summer cooling... range of equipment from a single room size to whole house size. G-E Air Conditioning profits step in after your regular heating season.



PROFITS from commercial air conditioning. Winter, summer or year 'round equipment offers you sales opportunity any time you choose. A complete line.



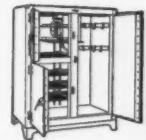
PROFITS from air circulators. A natural for lower income homes. For Homes, Offices, Stores, Shops, Factories. Another boost to off-season profits.

YEAR 'ROUND PROFITS

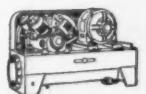
...from Commercial Refrigeration



PROFITS from water coolers. A complete line to meet every need of Shops, Stores, Schools, Hospitals, Factories. Also Bottled Beverage Coolers and Beer Coolers.



PROFITS from Food Storage and Display Cabinets. All types and sizes for Hotels, Hospitals, Restaurants, Delicatessens, Dairies, Butchers, Grocers, Bakers, Florists; Milk Coolers for Dairy Farms.



PROFITS from every type of cooling. Condensing Units, Cooling Units, Evaporative Condensers, equipment for Locker Storage Plants, Walk-in Refrigerators, etc.

GENERAL ELECTRIC

*Automatic Heating, Air Conditioning and
Commercial Refrigeration*

GENERAL ELECTRIC COMPANY

Div. 199-233, Bloomfield, New Jersey

Give me details of the new G-E Dealer Franchise for my territory.

NAME _____

STREET _____

CITY _____

STATE _____

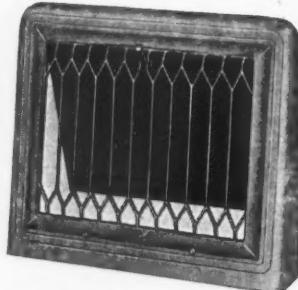
Get the NEW 1940 LOWER PRICES on U. S. Air-Conditioning Registers

New Low Lists now available on U. S. Directional-Flow AIR CONDITIONING REGISTERS for any Installation from the Finest Deluxe to the Lowest Cost Competitive Type

*The National Favorites
for Gravity Installations*



NATIONAL

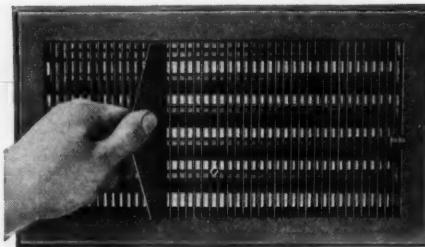


PANAMA

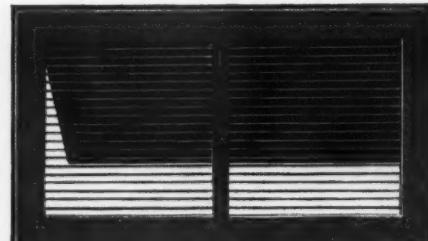
New prices . . . new designs for every class of work . . . U. S. has the ideal Set-Up for you for your 1940 Air-Conditioning Installations. Send today for complete information about the new styles and the STANDARDIZED New LOW LIST prices on U. S. AIR-CONDITIONING REGISTERS.

Have You Seen the New U. S. Vertical Flex-Bar Multiple-Valve A-C Register?

U. S. Engineering Craftsmanship and Precision Production Methods have been applied to the Flex-Bar type of register with outstanding results. Lever-Operated multiple-valves provide up and down deflections. Easy-set Flexible-Grille-Bars may be set with adjusting wrench to give any left and right or directional flows the room requires.



U. S. Louver-Type Registers — Single Valve with Inset Panels—Give Directional Flow at Low Cost



On highly competitive jobs where adjustability upward, downward, and sideflow is not required, the Horizontal-Bar Styles of U. S. Louver-Type Registers 153-straight-flow and 154-flow are priced so low as to practically eliminate the use of the ordinary Punched-Type of Forced-Air Register. They deflect the air currents away from the Ceiling —thus preventing ceiling discoloration. The extra cost for this protection is negligible. Side and multiflow deflections may be had with this style of Louver-Type Register by application of U. S. Inset Panels.



Send for New 1940 Price Schedules

UNITED STATES REGISTER CO.

BATTLE CREEK, MICHIGAN

MINNEAPOLIS • KANSAS CITY • ALBANY • SAN FRANCISCO • NEW YORK, N. Y.

CANADIAN MANUFACTURING DISTRIBUTORS—Canada Register & Grille Co., Ltd., Toronto, Ontario

service...the extent to which one exerts himself in cooperating with and assisting another to achieve his goal. The act of serving; the performance of labor for the benefit of another or at another's command.

OSBORN service means the maintaining of one of the country's largest stocks...keeping it constantly up-to-date...and being always ready to supply the needs of the trade for Sheet Metal Contractor's materials, tools and machinery; asphalt and asbestos roofing, siding and supplies; and for all types of warm air heating equipment.

A DEPENDABLE SOURCE
OF SUPPLY FOR 81 YEARS

THE J. M. & L. A.
OSBORN CO.
Manufacturers—Distributors
BUFFALO • CLEVELAND • DETROIT
Metals and Metal Products

**TOUGH
BENDING**

**CORROSIVE
CONDITIONS**



BETH-CU-LOY SHEETS

Get the job

It's a tough and intricate bending job to build a skylight that's both attractive and durable. Knowing this, the sheet metal contractor who recently fabricated these five skylights chose Beth-Cu-Loy Galvanized Steel Sheets.

He knew that the extra tight zinc coating on these Beth-Cu-Loy Galvanized Sheets wouldn't flake or peel even in the most severe bending operations. The sheets have a soft, uniform temper that invites good workmanship and makes every fabricating operation easier.

And there's a second sound reason for this choice, one that goes a long way toward building lasting customer satisfaction. Copper-bearing Beth-Cu-Loy Galvanized

Steel Sheets have a double defense against rust. Under the tight coating of pure zinc is the base of copper-bearing steel, shown by unbiased tests to have two or three times the life of ordinary steels or irons under highly corrosive conditions.

There are many jobs—from roofing, siding and flashing to ductwork—you can do better with Beth-Cu-Loy Galvanized Sheets. They are the logical, economical choice for all installations where corrosion attack is an important factor. For full information, write to Bethlehem Steel Company, Bethlehem, Pa., for Booklet 113 on Beth-Cu-Loy, the steel that offers double protection against rust at slight extra cost.

BETHLEHEM STEEL COMPANY



The New MONCRIEF DE LUXE LONG LIFE FURNACE...

Puts More Comfort and
Style in the Home...More
Money in Your Pocket

BACKED BY
20 YEAR
GUARANTEE

- You can make more money selling furnaces than you have made in a long while. You can give the home-owner more comfort, convenience, style—more all 'round satisfaction and bigger values than he has ever had before in a warm air furnace. The New Moncrief De Luxe Long Life puts the furnace business on a more-profit, more-satisfaction basis.

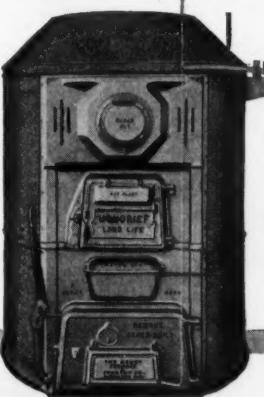
Here is your best chance to get away from price competition. Take on the Moncrief De Luxe Long Life and you will get more business more easily than before and make more money.



- Finished in beautiful two-tone green... Equipped with electric thermostat temperature controls and Thermo-Drip automatic humidifier

SHIPPED IN A COMPACT PACKAGE READY FOR QUICK AND EASY INSTALLATION

MONCRIEF STANDARD LONG LIFE



Any part of the heating unit will be supplied without charge if it burns out within twenty years. Round galvanized casing, Metaphram controls and automatic water pan filler. This has proved a great favorite and is going strong.

FURNACE DEALERS—Here is Your 1940 Profit Opportunity...Get the Facts

Don't wait another day before writing for particulars of this new furnace. Get ready NOW to do the increased furnace business the Moncrief De Luxe Long Life will bring you.

**THE HENRY FURNACE & FOUNDRY CO.
3473 East 49th Street • Cleveland, Ohio**

Manufacturer of Cast and Steel Furnaces and Winter Air Conditioners for Coal, Gas and Oil

Moncrief Supplies Everything Used on a Warm Air Heating and Air Conditioning Job

COPPER-ARMORED SiSALKRAFT

for Low Cost
Waterproofing
on Every Job!



SPANDREL beam waterproofing—thru-wall flashing—moistureproofing foundations, heads and sills, basement walls, and shower stalls—door and window flashing—these are only a few of the many applications for Copper-Armored Sisalkraft.

Now you can include permanent copper protection in every project, large or small, because this new, practical product costs only about 1/5 as much as heavy copper and has such a variety of uses.

Copper-Armored Sisalkraft is a perfect combination of pure electro-deposit copper bonded to tough Sisalkraft—it will not kink, crack or tear easily—applies as readily as building paper.

Light weight copper, for concealed uses, is every bit as capable of stopping moisture as heavy copper—and is just as permanent. But the lighter copper must be reenforced; to assure easy handling, flexibility, and intact application. That's why the sturdy sisal fibre reenforcement of Sisalkraft is so important.

Added together...light weight pure copper and tough Sisalkraft reenforcement give you the advantages of economical copper waterproofing in a variety of applications. Copper-Armored Sisalkraft is available in 1 oz., 2 oz., and 3 oz., weights in roll sizes up to 60 in. wide and 120 ft. long.

C. G. HUSSEY & COMPANY (Division of Copper Range Co.) ROLLING MILLS and GENERAL OFFICES: PITTSBURGH, PA.

The NEW IMPROVED line of

SUNBEAM

AIR CONDITIONERS

now includes

6 GAS • 3 OIL • 3 COAL

NEW SUNBEAM SERIES HL—GAS BURNING—A new, compact, attractive Unit with Cast-Iron heating element. 4 sizes with capacities ranging from 80,000 to 150,000 B.T.U. input per hour.

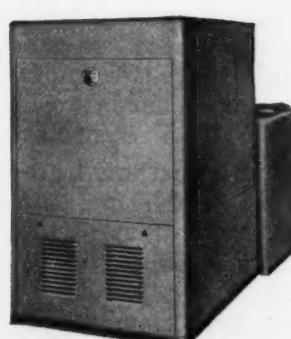
SUNBEAM SERIES H AND HV—GAS BURNING—Cast-Iron heating elements. Capacities range from 75,000 to 150,000 B.T.U. input per hour. HV has vertical return air intake through base.

AMERICAN HEATING EQUIPMENT COSTS NO MORE THAN OTHERS

NEW SUNBEAM SERIES SU—GAS BURNING—Steel heating element. B.T.U. capacities range from 70,000 to 150,000 input per hour—5 sizes.



NEW SUNBEAM SERIES SL—GAS BURNING—Steel heating element. 5 sizes with B.T.U. capacities from 70,000 to 150,000 input per hour.



SUNBEAM SERIES D—GAS BURNING—De Luxe Unit with Cast-Iron heating element. Especially attractive in appearance. Available in 4 sizes. Capacities range from 140,000 to 350,000 B.T.U. input per hour.

**AMERICAN & Standard
RADIATOR & Sanitary
CORPORATION**

NEW YORK

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PITTSBURGH

AGAIN Sunbeam brings you good news of new products... better products to help you make more profits... to give you unquestionable Air Conditioning leadership in your territory!

With the addition of the new Series HL (shipments will start in March), and the new improved Series SL and SU—all gas-fired air conditioners—the Sunbeam line is more complete than ever before. Besides these new products there are 3 other gas-fired Series, 3 Series of Oil and 3 Series of Coal burning Air Conditioning Units.

So whatever your prospect's needs may be... an Air Conditioner or a Gravity Furnace... cast or steel... coal, oil or gas... there is a Sunbeam unit to help you clinch the sale.

Remember too, our simple, trouble-saving Easy Payment Plan gives your customers low monthly terms... gives you cash on installation.

The complete Sunbeam line is only one of the many reasons why "More Heating Contractors Sell Sunbeam Than Any Other Make." It will pay you to get other important facts. Write for the name of the Sunbeam Jobber nearest to you.

*Quietness
and Dependability*

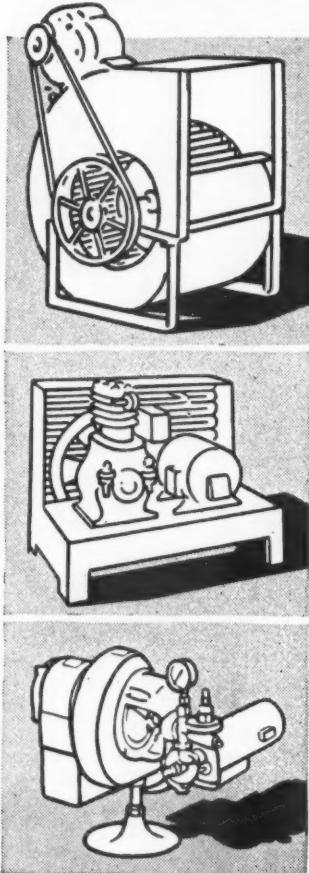
Two Important
Advantages
Assured by

Century



Specified Motor Performance

**in Heating, Cooling and
Air Conditioning Applications**



- When you sell or install any heating, cooling or ventilating equipment it's important to be sure about two conditions regarding the performance of the motor. Motors should be dependable, trouble-free, and they should start and operate quietly.

The Specified Performance of Century Motors assures you these two motor characteristics and many more. With Century motors properly selected and applied, Century can predetermine, in advance, the type of performance you and your customers will receive.

Century offers motors with high starting torque, ability to start and accelerate to full speed easily and quietly; insulation that assures added safety insurance against the common hazard of excessive dampness in basement installations; dependable, economical operation throughout long motor life. Their attractive exterior appearance matches modern equipment designing.

You'll please your customers when your installations are Century equipped. *And Century Specified Motor Performance is your assurance of satisfaction.* There's the correct Century motor, from fractional to 600 h.p. to accurately meet any motor problem in the fields of heating, ventilating, cooling, refrigeration or air conditioning.

Find out how you can benefit through Century Specified Motor Performance. Your nearest Century Motor Specialist is fully equipped to tell you. Call him in — for greater sales and satisfaction.

CENTURY ELECTRIC COMPANY

1806 Pine Street St. Louis, Missouri

Offices and Stock Points in Principal Cities



One of the Largest Exclusive Motor Manufacturers in the World

ANNOUNCING!

FOR GREATER
1940 PROFITS

— A New More Complete
Line of

**LAU NITEAIR
ATTIC FANS and
ROOM COOLERS**

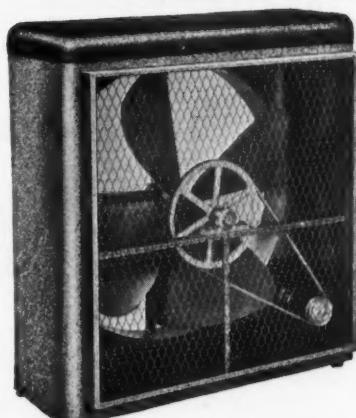


CUSTOMER SATISFACTION Plus 1940 PROMOTION PROGRAM Assures Big, Easy Profits During Hot Weather.

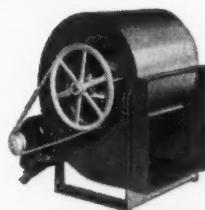
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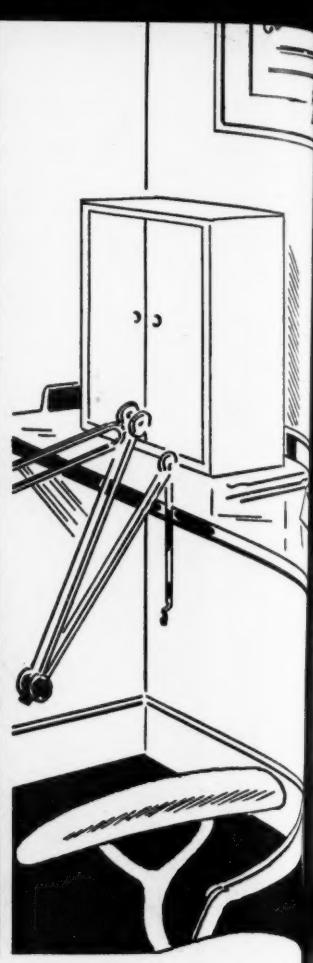
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Percy Clark Quintard
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"In reply to your letter of December 20th, the facts about the shelf of stainless 18-8 "Enduro are as follows:

"The shelf which is about four feet long and one foot wide was made for my office to go over a radiator, and incidentally to show all the various types of corners, roll rim, etc.

"When I moved from 18 East 48th Street, I had no place for it and sent it to my home in the country where it was stored in a leaky shed with a dirt floor for about five years, certainly damp all the time and covered with peat moss which was stored for use in the stable.

"Recently I got it out to see if it would do for a work shelf in the office of a young dentist who was a friend of my son.

"We did no polishing, just wiped it off with a damp cloth to remove the dirt and I assure you it is just as bright as the day it was made.

"I know of no other metal, and I have used most of them, which would not have completely lost its finish with that kind of treatment."

May we send you literature and suggestions as to where new business may be obtained on ENDURO—the stainless steel that will help you get more business? Write Republic Steel Corporation, Alloy Steel Division, Massillon, Ohio; General Offices, Cleveland, Ohio.

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Heating Systems For the Very Small Home

THE year just past offered the warm air heating-sheet metal industry one of the largest home building periods of the last fifteen years. From all parts of the country, reports indicate that home building was carried out on a scale which provided work for practically every size and type of shop. Indications are that 1940 will see an equal or perhaps larger building program.

FHA has announced that home construction for the limited income family will be encouraged. To this end FHA is launching a comprehensive schedule of publicity aid to institutions offering financing, material, and contracting. While FHA will not spend money for advertising, as we understand it, FHA will furnish all the advertising helps and suggestions required by participating institutions.

Further, FHA has some definite ideas on the size and types of homes needed. Particular attention will be paid, we hear, to the building of houses under Title 1 which covers the house costing \$2,500 and less. Under Title 2, the more expensive house will also be publicized.

As we stated several times in the last two years, this small \$2,500 house offers a distinct challenge to the warm air industry. Unless our industry can convince builders of the distinct advantages of central heating, this small house is likely to turn to circulating heaters as a source of warmth.

That the warm air heating industry has something advantageous to offer the small house owner, goes without question. Even where a basement is not included, we have types of central plants which are distinctly better than a "parlor heater." Observation leads to the conclusion that even in the very small house one source of heat supply cannot adequately heat remote rooms or rooms closed off from the heater. The only satisfactory method of obtaining uniform heat in all rooms is to supply heat through one outlet in every room. Then, no matter what living practice is followed, each room is independent of all others.

Within the last two years, manufacturers of heating equipment have given special attention to

furnaces for very small houses. The number of heaters in the 50,000 to 75,000 Btu output class has increased tremendously. Gas, oil, hand-fired coal, even stoker-fired small units are now available.

Granting that equipment is available, there is still a challenge to the industry—a challenge to the contractor. Given a small heater, there still remains the task of designing an installation which is not out of reason in its final installed price. This means, in most cases, that the system cannot be installed according to practice for the larger, basementsed house.

The big need in the small house is low cost. The installation and the necessary duct work, controls, registers, returns must be so arranged that costs are kept low. Not necessarily "cheap," inadequate installations, but ingenuity of design which gives central plant advantage without ordinary central plant complications. The article on Overhead Plenums in the January, 1940, Artisan is a very good example.

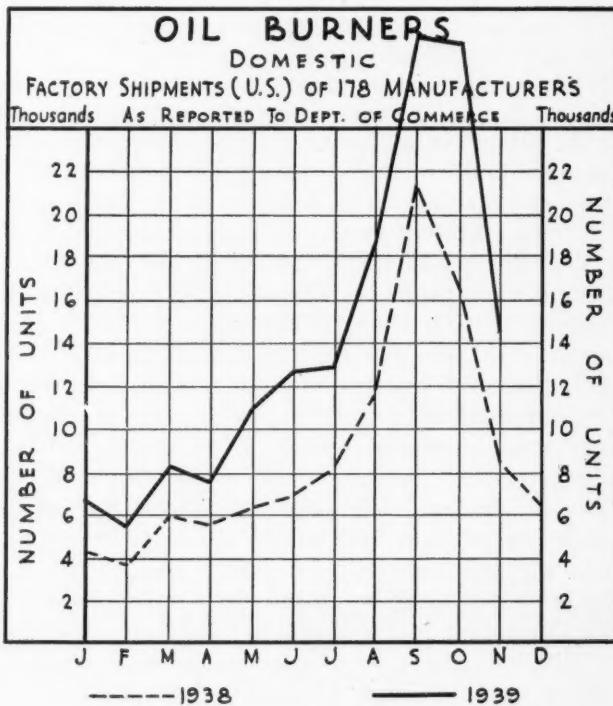
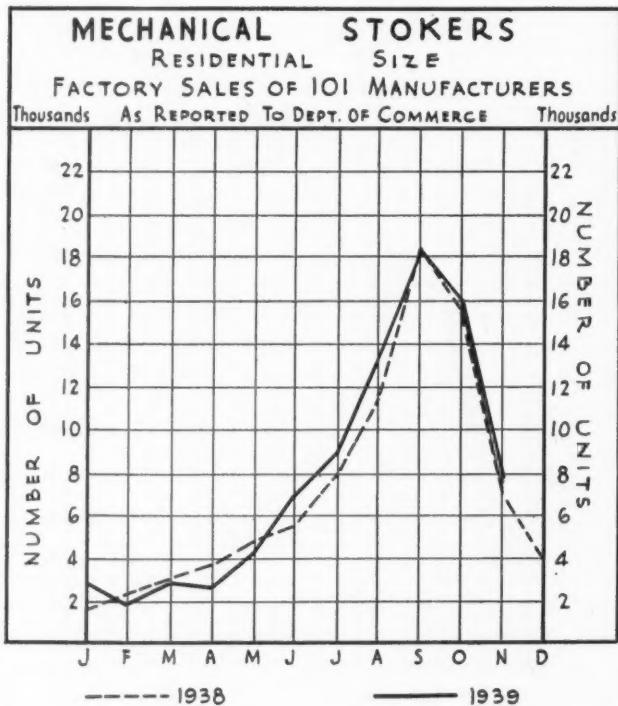
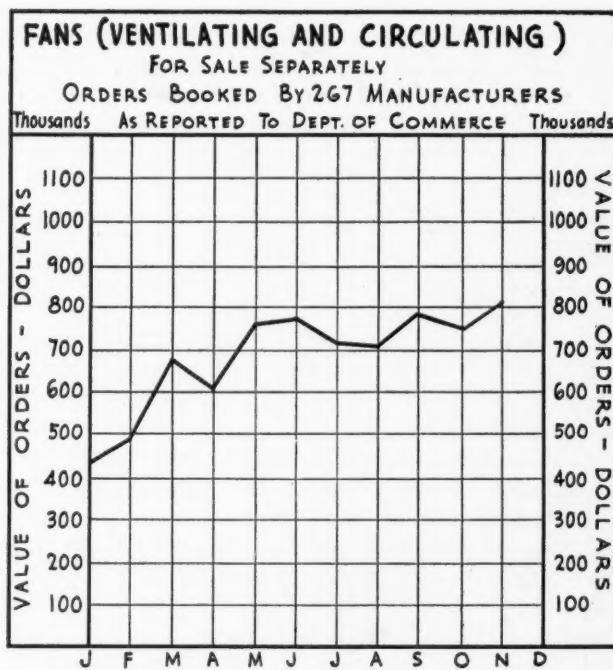
Undoubtedly equally good ideas will evolve from this apparent need for simplification. In our opinion, the final development, in most instances, cannot be perfected without the cooperation of the builder or owner. Small houses can be planned so that the central heating system is given primary consideration rather than being selected after all other features of the small house are planned. To accomplish this end, the heating contractor will have to devise ideas of installation and sell these ideas to the builder. Working together, the buyer will get a house with central heating plant advantages, without sacrificing interior arrangement and without excessive heating plant cost.

Much can be done, but most of the doing must come from the heating contractor. This industry, in the past, has met equally difficult problems, and solved them successfully. If small home building assumes the place everyone seemingly expects, the warm air heating industry must be ready with practical suggestions. To be ready, the manufacturers and the dealers, together with the industry's research organization, must give this problem immediate and careful study.

Current Business Trends

WITH the exception of ventilating fans, November orders and shipments followed the usual seasonal trend and dropped considerably under the big months of August, September and October. As explained before, statistics on winter air conditioning and ventilating fans have been available only since January 1, 1939, and therefore cannot be compared with any previous year. However, the winter air conditioning chart shows that in eleven

months \$27,511,703 worth of gravity and forced air furnaces were sold and these figures do not include all manufacturers. The other charts show that in the same eleven months orders for ventilating fans totaled \$7,559,560, that there were 85,033 residential size stokers sold against 80,682 in the same period of 1938 and that there were 155,576 domestic oil burners shipped to 99,793 in 1938.



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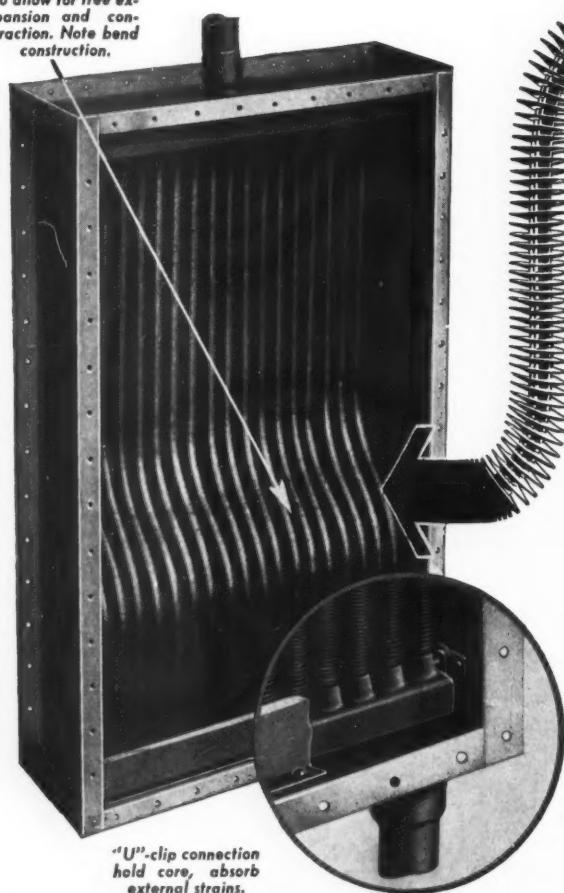
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How Many Returns?

The question—"How Many Returns" and "Shall I return from the second floor or from all rooms" is always a difficult decision in residential air conditioning. The author of this article, a designing engineer, has some definite ideas based upon personal experience with systems of all sizes. These ideas are advanced in this article. The ideas are not submitted as conclusive, but as one man's opinion.

By Ernest T. Selig, Jr.
Consulting Engineer, Pittsburgh, Penna.

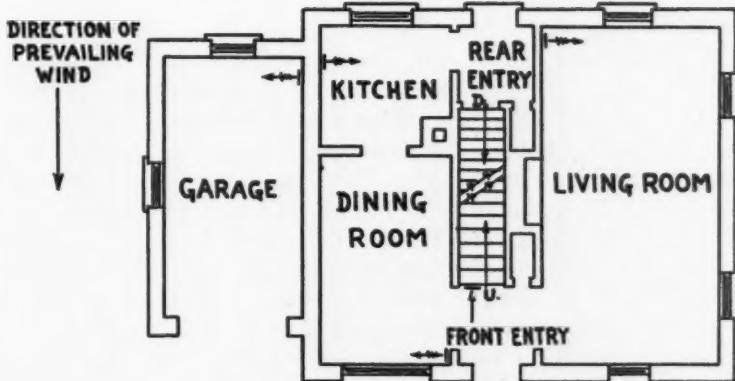
THE return system in warm-air heating should be considered as a drain to catch the cold air, just as a sewer inlet catches water. The number and location of cold-air returns will depend upon the size, arrangement and exposure of the house.

The proper handling of the cold air is of equal importance to the distribution of heated air, yet there is less precedent to follow and a wide diversity of practice has resulted. Many of the complaints recorded against warm-air heating are due to the improper design and installation of the return system.

Methods of Conveying Cold Air to the Furnace

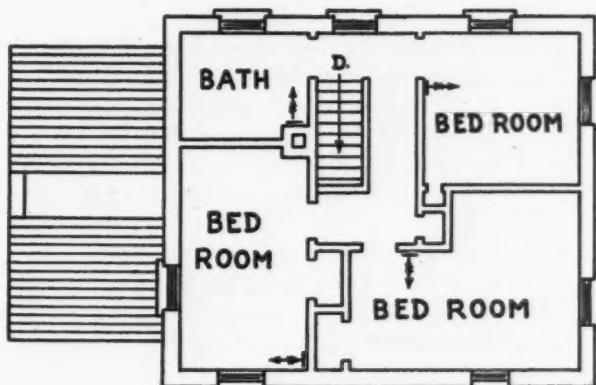
A system in which air is drawn directly from the outdoors to the furnace without any air being returned from the house, causes a pressure to be built up in the rooms and results in considerable exfiltration of heated air to the outdoors. While this type of system is inexpensive to install, it is usually unsatisfactory due to high fuel bills, excessive inside air dryness, difficulty of heating during severe weather, and added dust and dirt brought in from outdoors to settle in the house.

Where no provision is made for returning cold air from the first floor, the pressure built up in the rooms tends to retard the flow of warm air from the registers. This pressure may be sufficient under certain conditions to actually reverse the direction of air in the ducts to rooms on the windward side of the house and cause the air from these rooms to flow towards the furnace through the warm-air ducts. Unless the air in a room is permitted to escape through a return duct or otherwise, heated air necessary to warm the room cannot enter.

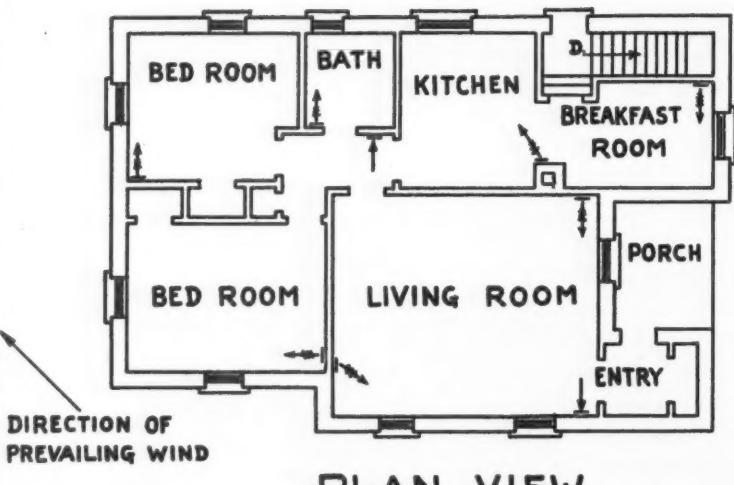


FIRST FLOOR PLAN

Figure 1



SECOND FLOOR PLAN



By providing a cold-air return, the withdrawal of air from the room will tend to create a suction effect and will encourage the flow of heated air from the supply register. The cold air filtering in around the windows and doors drops to the floor, and in passing into the return duct causes least interference with the flow of heat from the supply register.

Systems which provide for returns from the first floor, rather than directly from the outdoors to the furnace, are usually the most satisfactory. In this case, all fresh air must filter in through cracks around doors and windows on the windward side of the house. In most cases, ample ventilation is provided in this way.

A combination of the above two types, in which cold air is returned from the first floor as well as brought in from the outdoors directly to the heater, may be desirable with a house that is so tightly built and weatherstripped that there is insufficient infiltration of outside air to provide an adequate amount of fresh air. In ordinary houses this is not necessary. However, when it is provided, a damper should be installed so as to permit the use of inside air alone during severe weather, or outside air alone when there is contagious sickness in the house. The system should be designed so that none of the outside cold air can short-circuit into the rooms without passing over the furnace to be heated. Ducts carrying outside air should not exceed about twenty per cent of the total cross-sectional area of the warm-air supply ducts.

Returns in bedrooms should be equipped with valves or dampers so that they may be closed off at night if windows are open. No returns should be located in bathrooms, lavatories, kitchens and garages.

Number of Cold-Air Returns

With a small, compactly-built house, as shown by Fig. 1, it is often satisfactory to use only one cold-air return. This would probably be located in the central hall near the foot of the second-floor stairs or in the main entry.

Most frequently it is desirable to have two or three cold-air grilles, all located on the first floor,

as shown by Fig. 2 and 3. The largest should be placed so as to effectively receive the cold air coming down the stairway from the second floor. Additional returns should be placed along the windward side (prevailing wind) to catch the air filtering in around large windows and doors, thus preventing cold drafts across the floors.

Left—Fig. 2. Below—Fig. 3—The floor plans shown on the three pages offer a variety of house sizes and room arrangement. From these typical installations the author draws his conclusions. The number and location of returns; returns from second floor vs. open stair well return; and multi-return systems are all shown from author's plans.

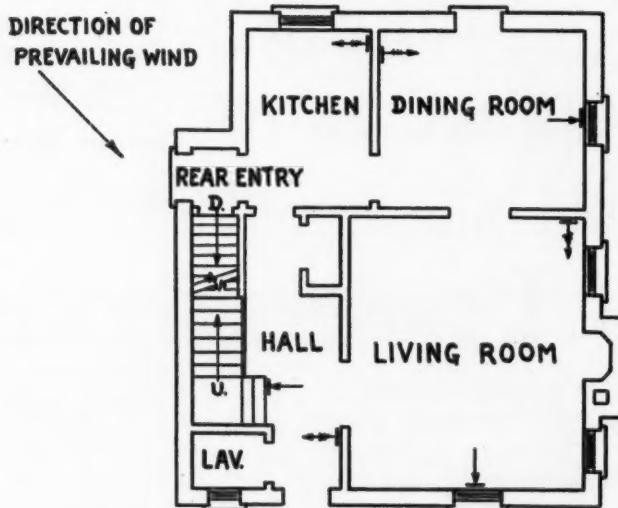
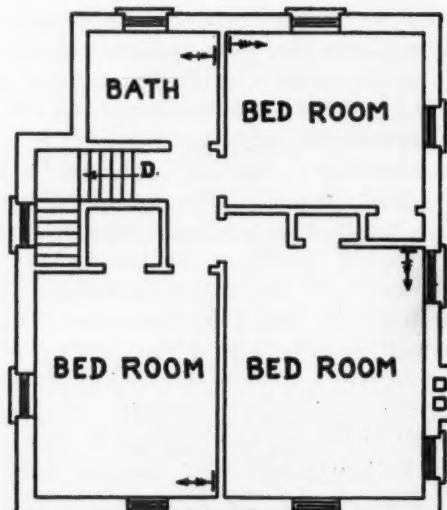


Figure 3



Second-Floor Returns Frequently Undesirable

Second-floor rooms are frequently as well heated when their returns are closed as when open, since the resistance to the flow of the return air is less by way of the stairway and the first-floor return system than through the second-floor grilles and ducts to the furnace. This is true even though the return air may have to pass through $\frac{3}{4}$ -inch cracks under the doors of the rooms in order to reach the first-floor returns or stair well.

Returns from second-floor rooms should seldom be used except in apartments or other spaces which are isolated or badly exposed, or where the room is below the level of the hall, as shown by Fig. 4.

When returns are located on the second floor sized for their proportionate volume of air and the cold air from these rooms persists in flowing to the first floor more readily than into the second-floor returns, these returns become ineffective. Under these conditions, the return opening in the first-floor hall cannot handle all of this cold air and the excess must flow across the floor of the first floor in an attempt to reach other returns. This air covers the first floor with a blanket of cold air and causes serious drafts. Thus an installation of returns from second-floor rooms may be not only more expensive to install, but also very unsatisfactory in operation.

Procedure in Designing the Return System

1. Consider the building as a whole, relative to the arrangement of rooms and their use, type of construction, exposure and climatic conditions and the venting effect of fireplaces and stairways. Consider whether there are any special conditions which justify returns on the second floor.

2. Calculate the heat loss for each room, expressed in Btu per hour.

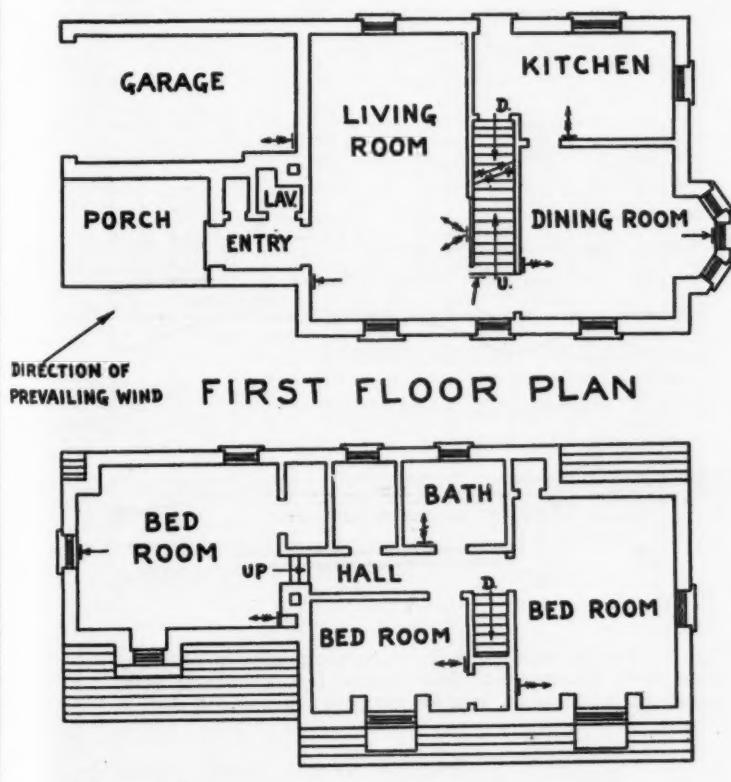


Figure 4
SECOND FLOOR PLAN

3. Estimate the temperature of the air leaving the registers in each room and thereby the cubic feet of air to be supplied.

4. Locate the warm-air registers so that the heated air will blanket the exposed walls on the windward sides of the rooms, or the walls having the most severe heat losses.

5. Estimate the velocity of the air discharged from the warm-air registers in relation to the sizes of the rooms and the distances from the registers to the opposite walls.

6. Locate the returns so that the heated air may be encouraged to blanket the cold walls as well as draw the cold air into the return system without causing drafts where people may be sitting.

7. Determine the quantity of cold air to be handled by each return. The quantity of air supplied to rooms having no return inlets (as is usually the case with second-floor rooms and bedrooms, lavatories, kitchens and garages on the first-floor) should be divided among the returns in other rooms, so that the total air returned to the furnace may be equal to that handled by the warm air distribution system. One or more large grilles may be located in the first-floor hall near the foot of the stairs to receive the cold air from the second floor as well as from the entry. The amount of air supplied to the kitchen and garage should be divided between the living and dining room returns in order to supply fresh air to the system to make up for that which is not returned.

8. Design the return system on the basis of the volume of air to be handled and the velocities practical in view of friction losses through the grilles and ducts. Vents should be provided to the outdoors from the bathroom, lavatories and kitchen.

Conclusions

1. Return inlets installed on the second floor of a house may be ineffective since cold air often flows more readily by gravity down the stairway to the first floor than into the second-floor returns.

2. In general, return faces should not be installed on the second floor except in rooms that are (a) isolated from the stairway, (b) severely exposed, or (c) below the level of the hallway leading to the stairway.

3. A multi-return system having grilles in all rooms of the house is usually less satisfactory than a two- or three-return system having returns only on the first floor. The multi-return system is more expensive to install and often is very unsatisfactory in operation.

4. The natural tendency is for heated air to rise from the first floor to the second via the stairway, and for the chilled air to flow from the second floor to the first by the same route. From my personal experience in designing and servicing forced-circulation warm-air heating systems, I have found that the most successful installations are those which utilize rather than overcome these fundamental characteristics. Such systems are more simple in design, less expensive to install, and more satisfactory in operation.

Air Conditioning Facts From the Research Residence

Problems of Two-Speed Fan Operation

In the December, 1939 issue, S. Konzo presented a discussion of control systems for two-speed blower operation. Since two-speed blower systems began gaining attention, Mr. Konzo states that the Research Residence staff have frequently answered certain basic questions. These questions and their answers are published here.

By S. Konzo

Special Research Assistant Professor
Engineering Experiment Station, University of Illinois

General Discussion of Two-Speed Fan Operation

SEVERAL questions arise in connection with the design and operation of a two-speed fan system that cannot be answered from the results obtained in the Research Residence. The discussion which follows should, therefore, be considered as merely **opinions**. For the sake of simplicity these questions and their answers have been listed as follows:

1. About how much more does the two-speed motor and controls cost than the usual single-speed motor and controls?

Answer—Present prices show that the two-speed motor and controls cost from about \$12 to \$20 more than the single-speed motor and controls.

2. Is it not possible to use a modulating damper in the return duct to control the air volume, in place of a variable speed motor?

Answer—It is possible and it has been tried. One of the chief difficulties with this method is that there is no way of determining beforehand where the dampers should be set to provide a given reduction in air volume.

3. What is considered as a reasonable reduction in air volume from high-speed operation to low-speed operation?

Answer—To a certain extent this is dependent on the speeds obtainable with two-speed motors. Motors are obtainable which provide a low speed of from 50 to 75 per cent of high speed. Results reported from the field indicate that a low speed which is 60 per cent of high speed gives satisfactory results.

4. When the fan speed is decreased 50 per cent, does the air volume also decrease by 50 per cent?

Answer—If the duct system is unchanged and no

changes in the damper setting are made, the air volume should decrease in the same proportion as the fan speed.

5. What about the corresponding decreases in static pressure and horsepower?

Answer—For a given duct system if the air volume is reduced to one-half of its value, the resistance is reduced to one fourth of its initial value, and the air horsepower is reduced to one-eighth of its initial value. The actual brake horsepower will not be reduced to the same extent as the air horsepower.

That is: in a given duct system in which the damper settings are not changed and the same fan is used, the resistant varies as the square of the

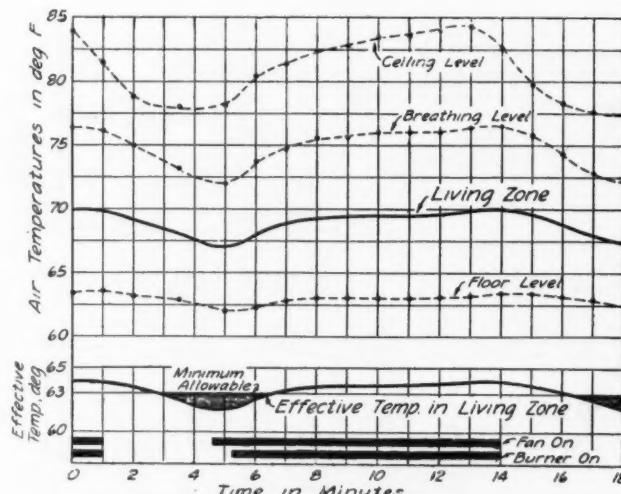


Fig. 1—Typical variations in room temperatures of living room with single-speed, intermittent fan operation. (Observations made when outdoor temperature was —8 deg. F.)

velocity, and the power requirement varies as the cube of the velocity.

6. If the fan speed is reduced by, say 50 per cent and the air volume to each room is correspondingly reduced, is the heat distribution also reduced in each room by 50 per cent?

Answer—The distribution of heat to the rooms in the structure will not be exactly 50 per cent, since some ducts will lose a larger proportion of heat at the lower velocities than others. Hence a system exactly in balance for high speed will undergo a slight unbalancing effect, that ordinarily will not be perceptible. Tests made in a factory set-up under the inspection of the writer indicated an unbalancing effect of less than 10 per cent. The

imum air delivery so that duct sizes, fan size, and motor size can be determined for the greatest load which will be imposed.

8. Should the system be balanced, after installation, on low-speed or high-speed operation of the fan?

Answer—It doesn't make much difference, but, since the system will function most of the time on low speed, it might be preferable to balance the installation under low speed operation. In any case the damper adjustments should be made when the system is operating normally.

9. Will a two-speed fan installation be satisfactory in an installation in which the warm air registers are located in the high sidewall?

Answer—It is the opinion of the writer that two-speed fan controls will function better in installations having baseboard warm air registers. However, two-speed fan control should prove almost as beneficial in installations having high sidewall registers. It is true that low register air velocities will not "throw" the air as far as high velocities, but to a certain extent this is counteracted by the fact that lower register temperatures accompany the two-speed fan operation, and lower register air temperatures usually favor minimum stratification.

10. In what type of plant do you consider the two-speed fan has the greatest possibilities?

Answer—The ordinary intermittently operated fan does a good job in small, compact structures. The two-speed fan is best adapted to medium- and large-sized installations particularly those which have unusual exposures, which are of the rambling type, or which are not completely protected against heat loss.

11. Do you think it will aid those systems in which drafts down the stairways are experienced when the fan is off?

Answer—The only effective way of controlling air movement is by fan operation, and since continuous operation at high speed is economically not always feasible, the best approach to the problem is by means of the two-speed fan. The low-speed operation of the two-speed fan may be considered as a "coasting" speed.

12. How would you set the bonnet thermostats?

Answer—In order to provide for the greatest amount of fan operation the low-speed cut-in point should be as low as comfort conditions will permit; that is a bonnet thermostat setting off from 100 deg. F. to 125 deg. F. The high-speed cut-in point can be set at from 150 to 175 deg. F.

13. What will happen under morning temperature pick-up conditions?

Answer—When the setting of the room thermostat is raised from, say 60 deg. F. to 70 deg. F., the burner will first turn on. When the bonnet air temperature reaches, say, 120 deg. F., the low-speed operation will begin. The room will begin to heat and the bonnet temperature will continue to rise. When the bonnet temperature reaches, say,

(Continued on page 51)

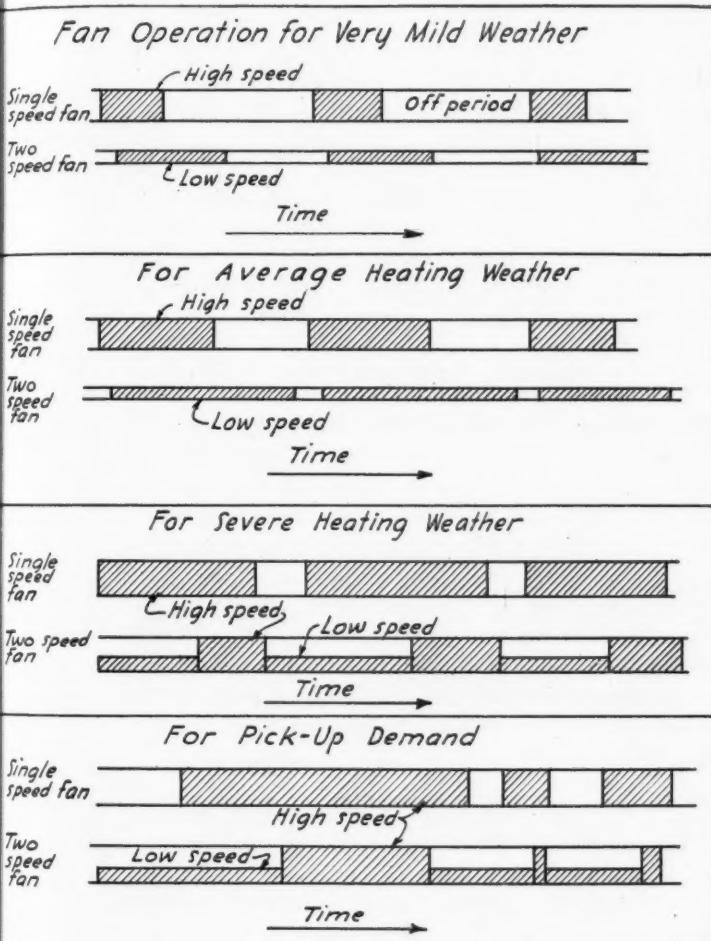


Fig. 2—Fan operation for single speed and two speed fan.

Fig. 2—Comparison of operating time and cycles for a customary single-speed fan system and a two-speed fan system for a variety of weather conditions. The charts show how the two-speed system gives practically continuous air circulation excepting in very mild weather. See questions 13 and 14.

unbalance is certainly only a small fraction of the unbalance in the ordinary single-speed system operated intermittently in mild weather and continuously in severe weather. In this case the unbalancing effect is 100 per cent.

7. Would you design the duct system for maximum air delivery or minimum air delivery?

Answer—The ducts should be designed for max-

Matching The Stoker To The Heater

By G. C. Ziliotto

MANY complaints on the part of the customer and many dollars to the stoker dealer would be saved if every installation were made properly. Poor installations have ruined the reputation of many a good stoker, and it is therefore vital to emphasize the fact that a stoker is no better than its installation.

We have already discussed and tried to answer the question of selecting the right size. Evidently, if a mistake is made at this point, no amount of good work in the installation can remedy the original sin. We shall therefore assume that the size selected is correct. Next we shall have to decide whether the stoker should or should not be pitted.

Naturally the dealer is anxious to avoid this extra expense if possible and sometimes stretches his conscience and good judgment a little too far in order to avoid pitting. Others pit any stoker indiscriminately in the belief that, if a minimum furnace volume is recommended and no maximum is mentioned, the greater the volume the better. While it is safer to allow a greater furnace volume than necessary for good combustion rather than a smaller volume, yet there are distinct objections to over-pitting.

Over-Fire Clear Height

Pitting a stoker may be necessary for two reasons. First, to obtain a minimum distance between the retort and the crown sheet, and, second, to increase the furnace volume. The first objective may be related to the second, as the only means ordinarily available for increasing the furnace volume is to lower the bottom.

A minimum distance between the top of the retort and the crown sheet is desirable, and in most cases is imposed by city codes, in order to prevent a direct blow of the flame against a restricted portion of the crown sheet. In hand-firing the coal burns with rather uniform intensity over the entire area of the grates and therefore it heats the crown sheet uniformly. But with stoker-firing the heat is more intense at the retort especially if the coal bed is rather low, in which case the flame will shoot up against that portion of the crown sheet directly above it. This concentrated heat will tend to cause uneven heating of the metal and will set up internal stresses.

If the boiler heating surfaces are clean of scale on the inside the damage will not be serious, but

if a thick deposit of scale reduces the heat transfer from the gases to the water, then the metal will become much overheated with respect to the adjacent portions which are not directly hit by the flame. The result will be a tendency of the metal surface to buckle, especially in steel boilers because of the greater coefficient of expansion in steel in comparison with that of cast iron. In any event the high temperature induced in the metal will make it corrode faster. For these reasons a minimum distance between the top of the retort and the crown sheet is desirable independently of whether there is enough furnace volume.

Necessary Combustion Area

A minimum furnace volume has to be provided in order to assure a good mixture of the air and the gases of combustion directly above or near the fire where the temperature is high. If this mixture takes place in the flues where the temperature is much lower, imperfect combustion will take place and some carbon will go out of the boiler in the form of CO instead of CO₂. Unlike CO₂, CO still has considerable heat content which is wasted if the CO cannot be burned to CO₂ before leaving the boiler. While the amount of air necessary for perfect combustion of one pound of coal is a well defined quantity, it is not possible to determine the amount of space necessary for a perfect mixture of the air and the gases per pound of coal burned. This determination is totally empirical and therefore subject to considerable difference of opinion based on results of tests made under different conditions. One cubic foot for every three or four pounds of coal burned per hour seems to represent a good average value of this ratio between furnace volume and coal burned per hour.

Another way in which this ratio is given is on the basis of Btu developed by the burning of the coal. Forty thousand Btu per cubic foot of furnace volume is a good average. This means that if the coal has a calorific value of 10,000 Btu per pound, we can burn 4 pounds of coal per cubic foot of furnace volume, whereas, if the calorific value of the coal is 14,000 Btu, it means that we can burn only 2.8 pounds per cubic foot.

In a round boiler it is easy to determine what constitutes the furnace space, but in a sectional, horizontal boiler, and in other types as well, this determination is not so obvious. If a sectional,

horizontal, cast iron boiler is composed of many sections so that its length is much greater than its width, it will not be possible or desirable to use the total length of the fire-box as a coal bed when the stoker is installed.

Fire Box Design

The retort should be located as near the front as possible in order to give the gases of combustion the longest possible travel inside the boiler, and also to make the removal of the clinkers easier. For this reason, if the total length of the fire-box is used as a coal bed, the coal will accumulate in the back, because beyond a certain distance from the retort the coal cannot burn for lack of air supply. This will have the effect of reducing the combustion chamber volume and at the same time the area of the heating surface exposed to the hot gases. For these considerations it will be better practice to install a brick wall back of the retort at a distance equal to that between the retort and the front of the boiler. (See Figure 1-B.)

This brick wall should be as high as the draft permits. It will serve not only to restrict the fuel bed to an area giving effective combustion of the coal, but by restricting the gas passage will induce greater gas velocity over it and better mixing of air and gas. In this sense it may prove more effective than a larger combustion chamber volume, as in Figure 1-A. The shaded portion of combustion chamber volume is a dead space contributing

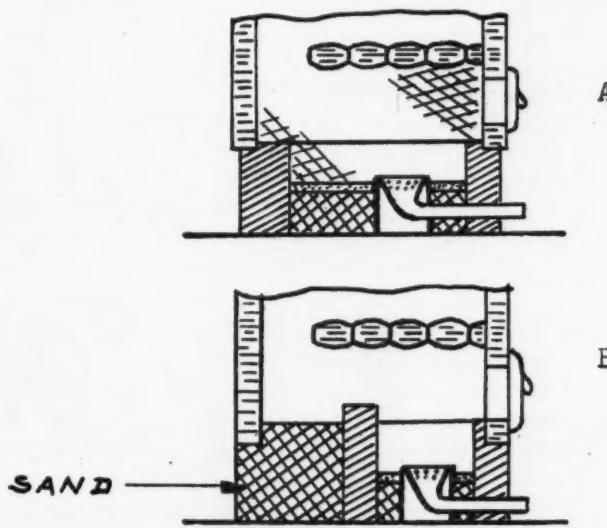


Fig. 1—Fire Box Design

very little to the mixing of air and gases of combustion, and therefore the reduction in volume shown in sketch 1-B is more apparent than real. As we have mentioned, the draft available will determine the height of this wall since the velocity induced in the gases of combustion depends on the draft. If the draft is not sufficient a pressure will be created in the fire-box by the blower and gas will come out of the front door and the cracks.

It is impossible to give more detailed instructions because of the variety of conditions imposed by the construction of different kinds of boilers and sto-

kers. In general, the shape of the floor plan of the fire-box should conform to that of the retort if possible. If the retort is round, the shape of the fire-box floor should be either round, or square with rounded corners.

Some retorts have small holes on the outside of the tuyere blocks; some have not. These outside holes should be plugged with furnace cement when the distance between the outside of the retort and the sides of the boiler is not so great as to prevent an effective burning of the coal farthest from the retort.

The volume of the furnace should be taken as that of the space above the fire bed if a back wall or bridge, as it is called, is installed, but in this case we can use a ratio of four pounds of coal per cubic foot of furnace volume. If, on the other hand, no bridge is installed, and we know from previous experience that unburned coal will accumulate in the rear of the fire-box, then we should compensate for this by using a ratio of three pounds of coal per cubic foot of furnace volume.

Restrictions of Codes

As we have already remarked, a minimum distance between the top of the retort and the crown sheet is not only desirable, but fixed by city codes. The minimum distances fixed by the Heating, Piping and Air Conditioning National Association and published in their Bulletin on the rating of boilers is a safe minimum to be used, but city codes will have to be consulted also and their instructions followed.

Apart from consideration of safety of the boiler, it will be found that a distance between the top of the retort and the crown sheet of less than about 24 inches, no matter how small the boiler and what the rate of combustion is, does not allow enough room for burning certain types of coking coals which form coke trees extending sometimes to the crown sheet. (See Figure 2.) These trees eventually break up and, as a result, a comparatively thick coal bed is formed. This fact in turn reduces the combustion space at the same time that it reduces the amount of air that can pass through the thicker bed. This combination of events may impair combustion to the point that coal keeps accumulating over the retort and eventually fills the space between it and the crown sheet.

A stoker that used to give this kind of trouble has been made to perform satisfactorily by the simple expedient of lowering it a few inches; while another, that used to work satisfactorily, after being raised at the insistence of the owner, immediately developed this kind of trouble.

Draft Control with Stoker Firing

Automatic draft regulators are very popular and very useful in oil burner installations, and therefore it is natural that, with their usefulness well established in the mind of the public and the oil burner dealer, they should be regarded as part and parcel of any automatic heating installation. Draft regu-

lators are sometimes very useful in reducing and controlling an excessive draft when a stoker is installed, but we should not overlook the different conditions obtaining with stoker firing as compared with oil burner firing. An oil burner has only one rate of firing determined by the size of the nozzle, which is not changed with the season, and the amount of air is set as near the theoretical minimum as will assure a smokeless flame.

The output of the blower is affected by changes in the draft as this has the effect of reducing or increasing the static pressure against which the blower has to deliver the air. If, after adjustment of the air, the draft changes, as it does with changes in the weather, our adjustment of the air will be affected one way or the other; as a result we may have too little air or too much. In the first instance the flame may become smoky and will soot up the boiler or furnace, but in either event it will reduce the efficiency of combustion. Hence an automatic draft regulator is useful because it maintains a steady draft and therefore allows a definite ratio between oil and air to be maintained irrespective of weather conditions.

It has also another purpose, namely: to allow us to reduce the draft to the minimum required for an effective exhaustion **through the smoke stack and chimney** of the gases of combustion. We em-

along this travel. But since no boiler installation is air tight, a certain amount of draft, which is nothing else but a small partial vacuum, is necessary in order to assure that the products of combustion will go out through the chimney and not through the cracks in the boiler and the smoke pipe. The fact that a boiler is never absolutely air tight and the fact that the air can enter the boiler through the blower intake even when the blower is not operating, makes it advisable to reduce the draft to the very minimum required to prevent an escape of the gases of combustion through any opening other than the smoke stack.

Stoker Firing Conditions

With stoker firing the conditions are entirely different. Here we have usually three coal feed rates which the owner can change at will, making whatever adjustment he can in the air supply, if he bothers at all to do so. Besides, the fuel bed conditions change during a cycle of operation of the stoker so that it is impossible to set a definite ratio of air supply to coal feed which will be maintained for any length of time. The value of an automatic draft regulator in keeping a constant draft is therefore negligible in stoker firing. It remains true, however, that by allowing us to reduce the draft it helps to reduce infiltrations of air through cracks and leaks in the boiler, and to this extent it is useful.

Against this advantage, however, we have to consider the disadvantages that may result from a low draft. If we do not temporarily increase the draft by counterweighing more heavily the draft regulator when we take out the clinkers and rake the fire, or when we clean the boiler, we are likely to have gas and smoke pour out of the doors because the volume of gas that the smoke pipe and the chimney can exhaust depends on the draft and, if this is low enough, it may not be sufficient to make the chimney handle all the gases of combustion and the air entering through the doors as well. It is only in those cases where the draft is unusually high that a draft regulator will give good results.

In most cases a thorough calking of all the cracks with furnace cement or asbestos putty and making all doors tight will be all that is necessary to prevent in-leakage of air which can sometimes considerably reduce the efficiency of the boiler or furnace. In this connection we want to mention also the fact that considerable deposit of fly ashes accumulates in the flues with stoker firing and therefore, as this accumulation reduces the free area of these passages, a strong draft will be required to remove all the gases of combustion as they are produced.

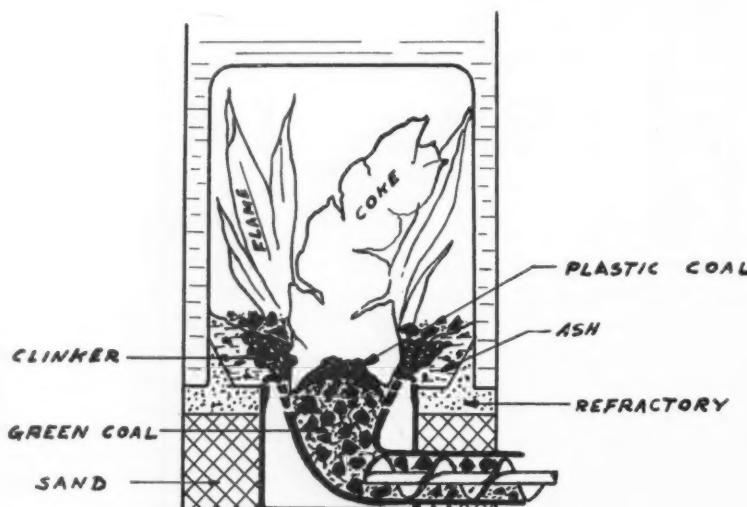


Fig. 2—Coke "trees" in a retort

phasized "through the smoke stack and chimney," because this is the principal function of a draft in a boiler fired by an oil burner which is provided with a blower. The blower provides the air and the pressure to move it through the boiler, the smoke stack, and chimney if there were no leaks

**Part I of this discussion was published in the January, 1940, issue.
Part 3, which will conclude the series, will appear in March. The author is attempting to discuss all the problems which arise in the installation of a stoker in such a way that the contractor can check his decision or selection by more than one method.**

Questions are invited.



A Five-Zone Stoker-Fired System Incorporating Advanced Ideas in Design

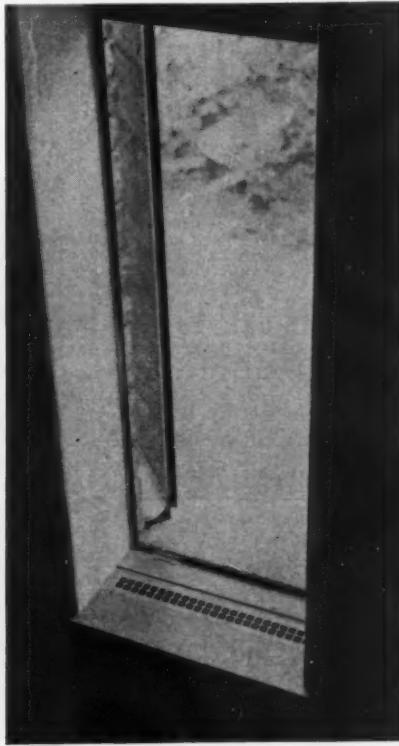
ONE of the largest, most elaborate and interesting Cleveland residential air conditioning systems completed in 1939, was designed and installed by Franck and Fric, Cleveland, in a country residence requiring 49 warm air registers and 47 return air faces; a total of slightly over 5,100 cfm delivered at the registers; and with heat generated by a 75-pound-per-hour bituminous coal stoker.

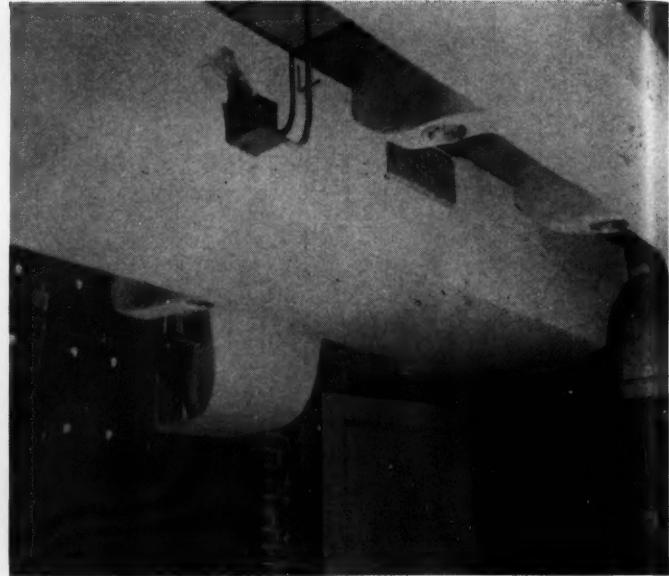
As the floor plans show, the house is spread in two wings, thus making three exposures in several principal rooms. To insure uniform temperatures throughout and to minimize the effects of sunshine and wind on exposed rooms, Franck and Fric recommended five zones as shown on the plans by ther-

mostat numbers and zone numbers assigned to registers. The zones so arranged according to both exposure and occupancy. Thus all bath rooms are on one zone; the library, stair hall, entrance hall on the first floor; and one master bed room, stair hall and one guest room on the second floor are on one zone arranged by exposure. The living room, on the first floor and a master bedroom and sitting room, above, are on another zone, arranged for exposure. The dining room on the first floor with one guest room and corridor on the second floor are on one zone. The remainder of the rooms are on the fifth zone.

Franck and Fric are strong advocates of zoning,

Abcve—Front of furnace showing insulated ducts and some of the controls. The front cover shows the stoker end of the furnace. Below—Floor grilles, window sill registers used in many rooms.





even in small houses. Zoned systems, say the firm members, are easy to balance, and after balancing there is very little cause for service. Furthermore, most owners know little about heating and owners of large houses, especially, are apt to turn all heating decisions over to the architects. It is a policy of Franck and Fric, therefore, to sell the owner on the idea that good heating is an absolute essential and should be given more consideration than plumbing, decorating, etc.

These same large house owners, according to the firm's experience, are also prone to expect results of the heating system which can not be furnished unless the owner is willing to take the time to specify exactly the conditions desired in each room or each group of rooms. The firm's policy, therefore, is to discuss with the owner just what is specified, what is necessary structurally to meet the specifications and what results can not be obtained without certain changes. The result usually is a better-designed, higher-priced system than the owner originally had in mind, but a system which has no "kick-backs."

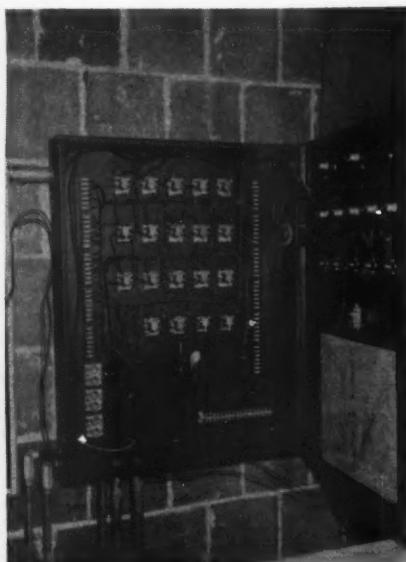
Because the owner knows little about heating and the servants even less, Franck and Fric take every reasonable precaution to design and plan a system which is tamper-proof. Zoning gives the system full opportunity to meet the demands of occupancy or

exposure and each zone is balanced with an anemometer or Velometer to room temperature. Fast acting thermostats also aid in getting quick response which large home owners seem to demand. In balancing, all quadrants are set and tagged to designate the room served by each branch and each damper number and setting is entered on a chart which is placed in a box under glass in the heater room. If anyone, for any reason, changes the settings, the zone can be re-balanced by returning the dampers to the original setting.

Operating Details

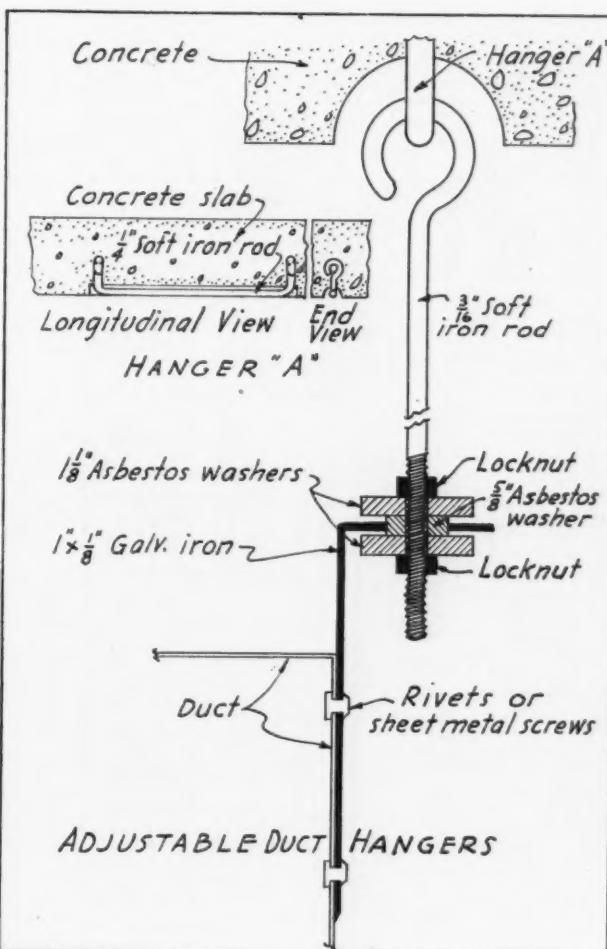
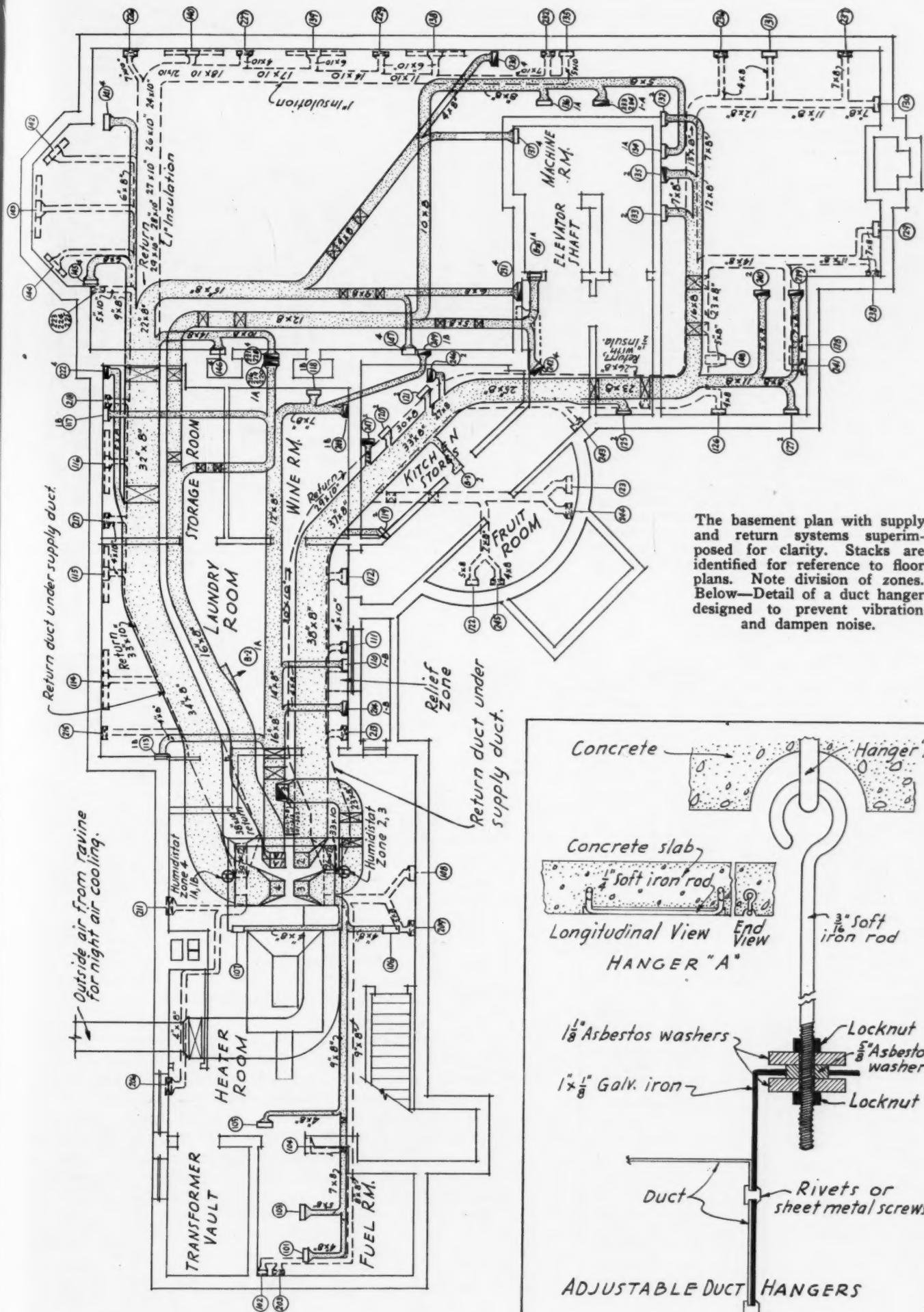
This is a stoker-fired job. On all stoker jobs, Franck and Fric install a relief zone which spills into the garage or basement rooms or to the outdoors. In this particular house the garage and basement were not available for relief, so a duct was cut through a basement window as one photograph shows and any excess in temperature is blown outdoors.

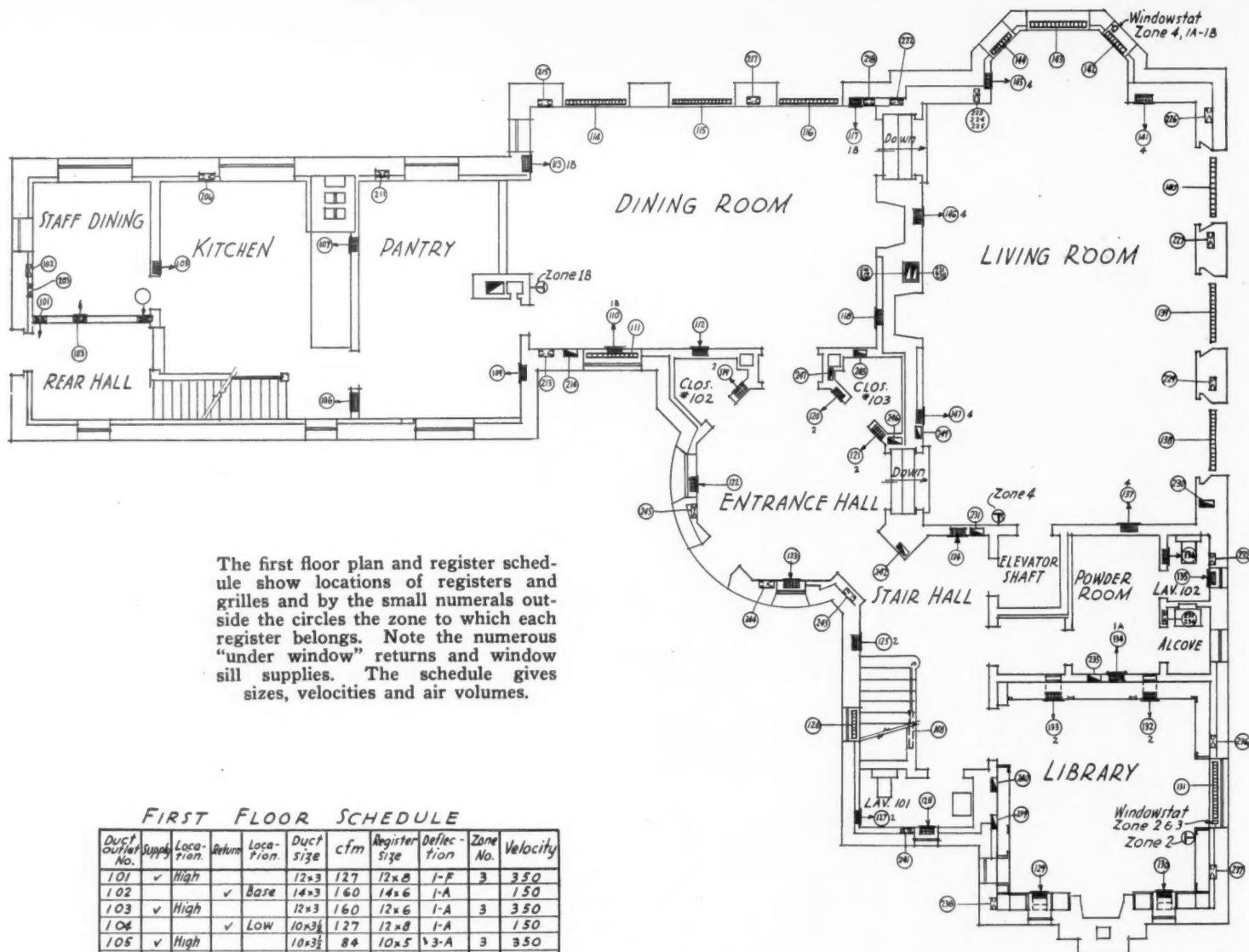
In operation, whenever a zone calls for heat, the zone damper opens. In opening the damper also starts the stoker and blower. When the zone is satisfied, the zone damper closes and the stoker stops. A low limit switch in the blower line prevents the blower from operating until the bonnet



Above—Insulated duct work in the temporary job shop and the relief zone through window which passes excess warm air outdoors.

At left—The control system, as described, is unusually complete. The brain of the system is the box shown to the left in which all control instrument leads are centralized and identified. Lights light when anything goes wrong, or light when certain functions are in operation.





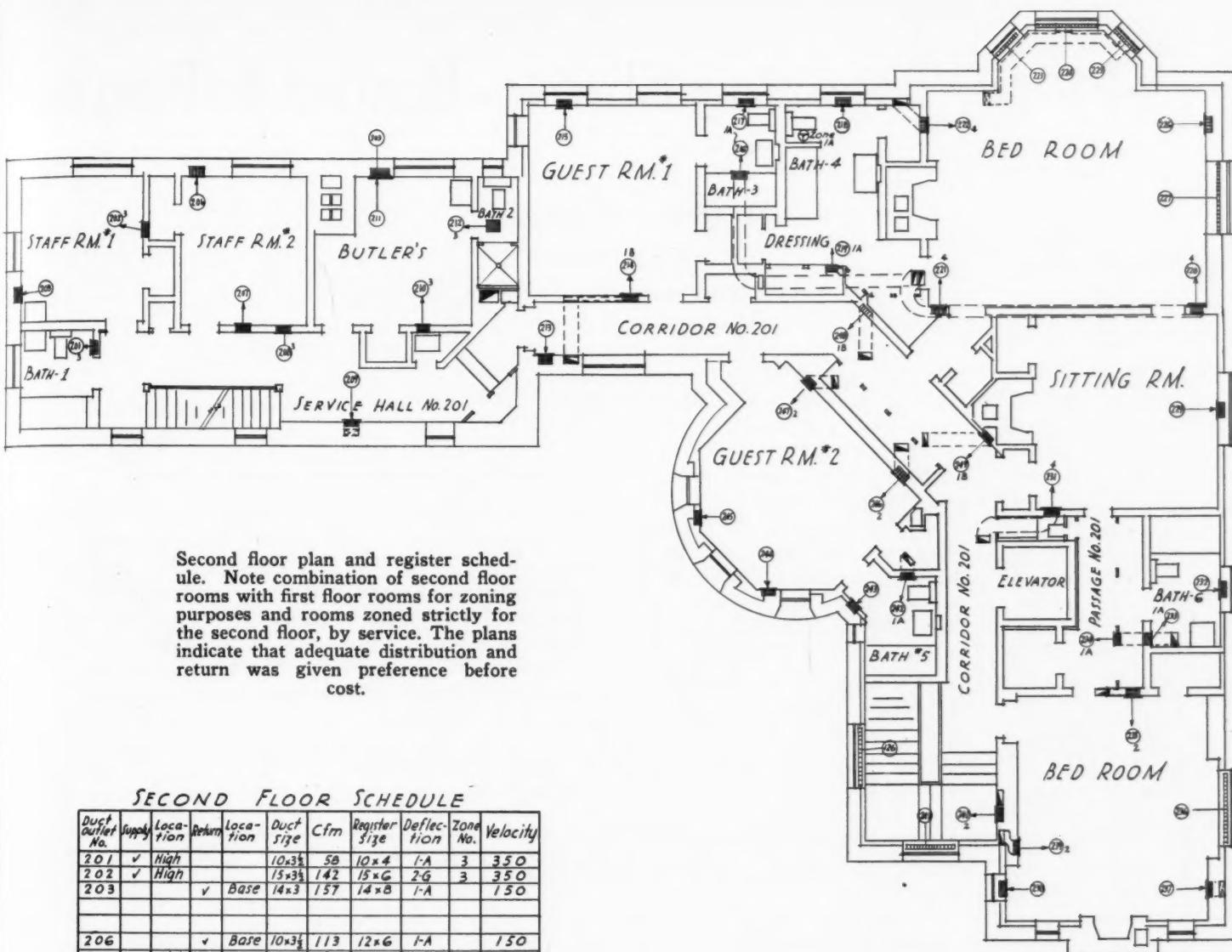
The first floor plan and register schedule show locations of registers and grilles and by the small numerals outside the circles the zone to which each register belongs. Note the numerous "under window" returns and window sill supplies. The schedule gives sizes, velocities and air volumes.

temperature reaches a preselected setting. If the bonnet air is up to the setting as a result of another zone already operating or just closed, the blower can run immediately. A high limit switch in the blower line starts the blower if bonnet temperatures reach excessive degrees. This excessive air is blown outdoors. A high limit switch shuts off the stoker when the predetermined high setting is reached.

Adequate humidity was specified by the owner with the reservation that humidification should be cut off whenever windows show condensation. The two humidifiers (spray) are located, as shown on the basement plan, in each cold air return box at the furnace. Humidity supply is controlled by humidistats in the cold air returns, which open the humidifier whenever the blower is running unless condensation is forming. In this case, the humidifiers are cut off. Condensation is controlled by windowstats located as shown on the plans. Whenever condensation appears, these instruments cut off the humidifiers regardless of the humidistats.

Air Distribution

One of the interesting details shown in the plans is the location of registers and grilles. Many of the returns are in the floor, beneath windows and French doors; other returns are in the window sills.



Second floor plan and register schedule. Note combination of second floor rooms with first floor rooms for zoning purposes and rooms zoned strictly for the second floor, by service. The plans indicate that adequate distribution and return was given preference before cost.

SECOND FLOOR SCHEDULE

Duct outlet No.	Supply Location	Return Location	Duct size	Cfm	Register size	Deflection	Zone No.	Velocity
201 ✓ High			10x3½	58	10x4	1-A	3	350
202 ✓ High			15x3½	142	15x6	2-G	3	350
203 ✓ Base			14x3	157	14x8	1-A		150
206 ✓ Base		Base	10x3½	113	12x6	1-A		150
207 ✓ High			12x3	98	12x6	1-A	3	350
208 ✓ Low			14x4	185	14x6	3-A	3	350
209 ✓ Base		Base	14x3	185	14x8	1-A		150
210 ✓ High			10x3½	75	12x5	1-A	3	350
211 ✓ Base		Base	10x3½	89	12x6	1-A		150
212 ✓ Cell.			10x3½	25	8x4	2-E	3	350
213 ✓ Base		Base	10x3½	105	14x6	1-A		150
214 ✓ Low			10x3½	99	14x6	3-H	18	350
215 ✓ Base		Base	10x3½	99	14x6	1-A		150
216 ✓ High			12x3	54	12x4	1-A	1A	350
217 ✓ Base		Base	10x3½	54	12x4	1-A		150
218 ✓ Base		Base	10x3½	88	12x6	1-A		150
219 ✓ High			12x3½	76	12x6	2-G	1A	350
221 ✓ Low			14x4	158	14x8	1-G	4	350
222 ✓ Low			12x3	114	11x9	2-H	4	350
223 ✓ Sill			10x2½	45	24x2½			
224 ✓ Sill			10x2½	45	57x2½			
225 ✓ Sill			10x2½	40	24x2½			
226 ✓ Base		Base	14x4½	218	24x6	1-A		150
227 ✓ Sill			10x2½	45	65x2½			
228 ✓ Low			14x3½	21	14x6	2-G	4	350
229 ✓ Base		Base	14x4	169	20x6	1-A		150
230 ✓ Low			10x3½	85	12x6	2-E	4	350
231 ✓ Low			10x3½	85	12x6	2-F	4	350
232 ✓ Base		Base	10x3½	84	12x6	1-A		150
233 ✓ High			14x3½	70	12x6	2-E	1A	350
234 ✓ High			14	8x4	3-A	1-A		350
235 ✓ Low			14x6½	170	20x6	3-A	2	350
236 ✓ Sill			10x2½	40	65x2½			
237 ✓ Base		Base	14x4	150	20x6	1-A		150
238 ✓ Base		Base	14x4	150	22x6	1-A		
239 ✓ Low			14x3½	168	11x11½	3-A	2	350
240 ✓ Low			12x3	109	14x6	1-A	2	350
241 ✓ Sill			10x2½	35	52x2½			
242 ✓ High			12x3	63	12x6	3-A	1A	350
243 ✓ Base		Base	10x3½	63	12x6	1-A		150
244 ✓ Base		Base	10x3½	93	16x6	1-A		150
245 ✓ Base		Base	10x3½	93	14x6	1-A		150
246 ✓ High			10x3½	93	14x6	2-F	2	350
247 ✓ High			10x3½	92	14x6	2-E	2	350
248 ✓ Base			12x3	104	14x6	off hand	18	350
249 ✓ Base			12x3	105	14x6	4-B	18	350

These locations for returns were chosen in order to catch infiltration before the cold air has a chance to spread out across the floor. The locations on the plan should be compared with the register and grille sheet, which shows location and size. Some of the grilles are very long and very narrow.

On the warm side, Franck and Fric specified plenty of registers and placed them so that issuing air would sweep or carry to all exposed walls or glass surfaces. The register and grille sheet also shows that special deflection was specified for every register to insure air blanketing. All return faces have dampers with knob and screw shaft adjustment.

Outside Air—Air Cooling

One of the interesting features of this system is the outside air intake. Behind the house there is a ravine some 60 feet deep, heavily wooded and by inspection some 10 degrees cooler than terrace air in the summer. The outside air intake shown on the basement plan connects to a 24-inch pipe which opens at the bottom of the ravine. Inside the basement (see photograph) there is a damper and modulating motor operated from a hand controlled rheostat on the panel board. If cooling is desired, this damper can be opened full so that the full capacity

(Continued on page 84)

Two-Piece, Tapering Elbow—Round to Round*

By William Neubecker

Head Instructor

Sheet Metal Department, New York Trade School

A CORRESPONDENT from New Jersey desires information on laying out five types of stove and furnace pipe fittings commonly used on new and repair jobs. The three types of tapering elbows are "Round to Round;" "Oval on Sharp" to Round; "Oval on Flat" to Round also two types of offsets "Oval on Sharp" to Round and "Oval on Flat" to Round. He states that in small towns there is always a demand for fittings of this kind, which are made up on customers orders. The sketches submitted by our correspondent contained full size dimensions. In this connection it is proper to say, that the principles which will be shown herewith are applicable regardless what the dimensions may be.

Short methods have been requested and are shown in three of the problems, while in two problems, the true

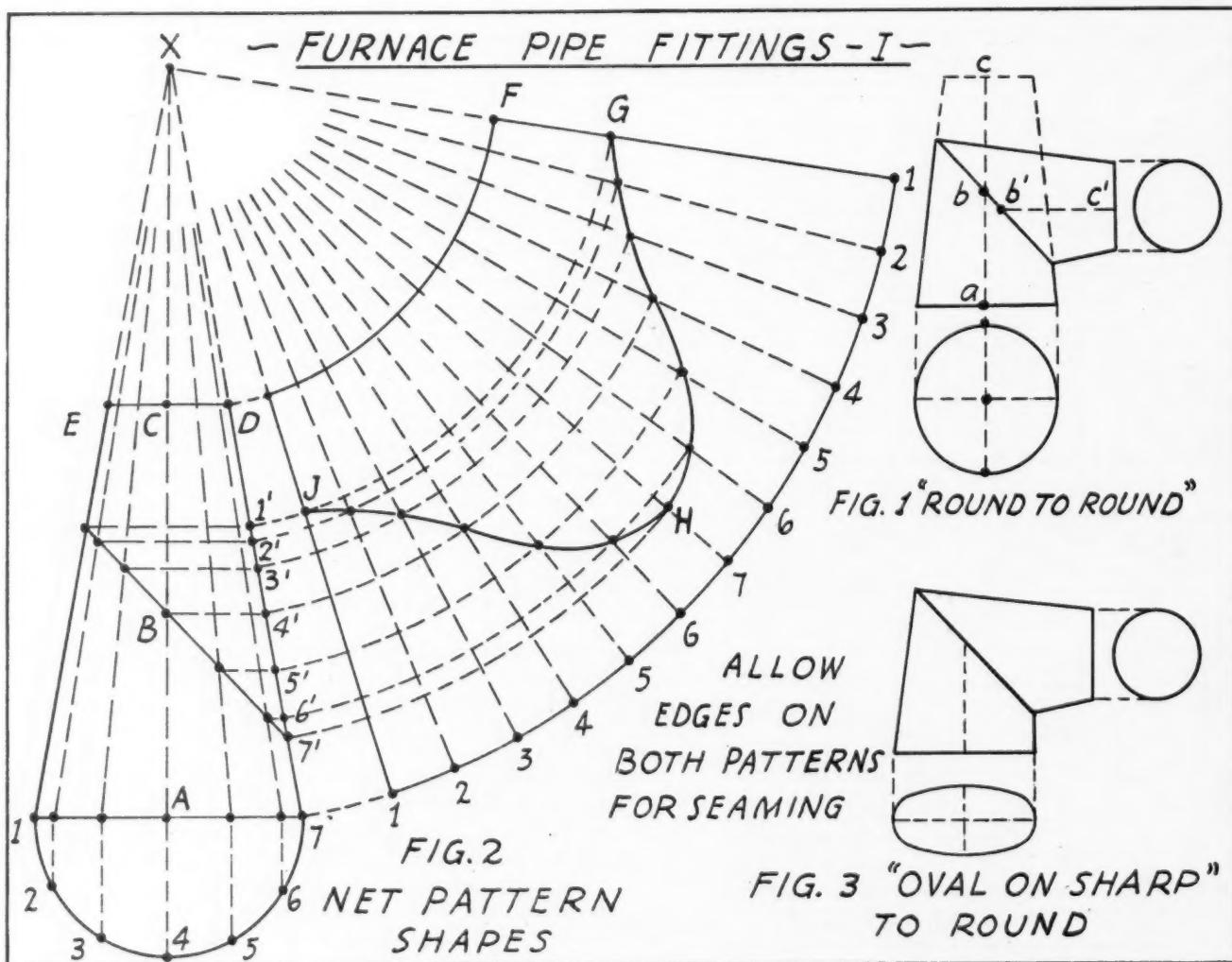
geometrical rule had to be used to obtain accurate developments.

Two Piece Tapering Elbow, Round to Round

Fig. 1 in the accompanying illustration shows a two-pieced tapering elbow, round to round. Tapering round elbows are usually cut from the frustum of a right cone. This is the true geometrical method. No shorter rule can be found if accuracy is desired.

Draw any vertical line as $X-A$ in Fig. 2 and make 1-7 equal to the diameter of the large end. Establish at pleasure the length of the lower arm $a-b$ in Fig. 1 and set it off on the line $A-X$ in Fig. 2 as shown from A to B . As the tapering elbow is to be a two-pieced, 90-degree, then divide 90 by 2 and obtain 45 and through B draw the miter line at 45 degrees, indefi-

*All rights reserved.



nitely, as shown.

If the distance from 7 to 7' is to be of a given height, then simply raise the point B as much as desired and make B-C equal to A-B and E-D equal to the diameter of the small end. Draw lines from 1 and 7 through E and D respectively to intersect at the apex at X. Use A as a center and describe the semi-circle 1-4-7, which space in equal divisions as shown and from these divisions 1 to 7 erect vertical lines to intersect the base of the cone 1-7 as shown by the heavy dots.

Pattern Procedure

From these intersections on 1-7 draw radial lines to the apex X, to intersect the miter line as indicated. From the intersections on the miter line, draw lines at right angles to X-A to intersect the side of the cone from 1' to 7', which correspond in their proper relation to corresponding numbers in the semi-circle. The pattern can now be laid out.

With X as center and with radii equal to X-7 and X-D draw arcs indefinitely as shown respectively by 1-1 and D-F. Now starting from 1 on the lower arc 1-1, step off twice the number of divisions contained in the semi-circle, as shown from 1 to 7 to 1 in the pattern. From 1 and 1 draw radial lines to the apex X to intersect the upper arc at D and F respectively.

From the balance of the divisions 2 to 7 to 2 in the pattern, draw radial lines to the apex as shown and intersect them by arcs struck from similar numbered intersections 1' to 7' on the side of the cone D-7, using the apex X as a center. Through these points of intersection, trace the irregular curved miter cut as shown from G to H to J.

Then will D-F-G-H-J-D be the net pattern for the upper arm and G-H-J-1-7-1-G the net pattern for the lower arm. Laps must be allowed for seaming and riveting.

Two-Pieced, Tapering Elbow "Oval on Sharp" to Round

Fig. 3 shows a side elevation of "Oval on Sharp" to round elbow. In this problem triangulation of the lower arm can be avoided by using the following method:

Take a strip of metal about one-half inch wide and place it around the cast iron oval collar on either stove or furnace and obtain the exact girth. To find the diameter of a round pipe of a given girth, three methods can be used. Assume that the girth or circumference just obtained was 22 inches. 1; Then divide 22×3.1416 thus:

$$3.1416)22.0000(7 \text{ and obtain } 7 \text{ inches; 2; consult} \\ 219912$$

a table of circumferences and areas of circles usually found in the shop. Follow the circumference column and find 21.9912 as the nearest number to 22 which will suggest 7 in the diameter column; 3; run the metal strip through the rollers, to get a true circle and measure the diameter. The writer recommends the circumference table for accuracy.

Now, knowing the diameter of the round circle which equals the circumference of the oval collar, proceed exactly in the same manner as was shown in connection with Fig. 2. When the patterns are developed as shown by D-F-1-7-1-D rivet or lock the side seams, then form up the lower branch to correspond to the oval collar, and the upper branch to fit the round pipe.

The profiles at the miter joint on both arms, must also be shaped, because, when the upper part of the cone shown dotted in Fig. 1, is reversed, and set on the miter line, the line b-c will be in the position shown by b'-c'. As the diameter through b' on the miter line, is greater than the diameter through b, (because the taper increases below b), therefore a slight shaping will be required when seaming the joint, so as to bring these two arms in their proper positions.

Konzo-Two Speed Blower Problems

(Continued from page 41)

160 deg. F, the fan will shift from low speed to high speed, and the room temperature will begin to increase more rapidly. The bonnet air temperature will decrease sharply for a while and might allow the fan to operate at low speed for a while. Later the bonnet air temperature will continue to rise until either the room is satisfied or the burner is shut down by the bonnet thermostat. The fan will continue operating at high speed until the bonnet thermostat is reduced to about 160 deg. F, when the low-speed operation will begin. A temperature overrun in the room will be obtained, but the overrun will not be large and, furthermore, it will be of advantage in removing the "chill" from the house and its furnishings.

14. What happens in extremely mild weather?

Answer—In extremely mild weather the fan will operate intermittently at low speed. The difficulties that have been enumerated with the off-periods of the fan are not of any consequence in extremely

mild weather, and hence intermittent fan operation will not cause any difficulties.

15. Why not design the ordinary single-speed fan system on the basis of high register temperatures and low air volume and then when the plant is installed set the bonnet thermostat down low, to, say, 110 deg. F, and thereby get practically the same effect?

Answer—That can be done, but such a system has no reserve for severe weather conditions and the bonnet air temperatures under severe demand may get out of hand. If such a system is used it is most essential that a bonnet thermostat be provided to shut down the burner when the bonnet air temperature reaches about 175 deg. F.

16. Can the variable fan speed be attained by changing the pulley diameter on the motor rather than by changing the motor speed?

Answer—As far as the writer knows, two such devices have been developed which will automatically change the pulley diameter. Only time and field trials will indicate whether such devices will stand up under the load.



PROBLEM CORNER

Billiard Hall Ventilation

American Artisan:

We have a job to ventilate a billiard hall 22 feet by 102 feet with a 12-foot ceiling (about 27,000 cu. ft.). What size propeller type fan will be required to remove some of the smoke and warm air? If we use an overhead duct, will three exhaust openings, equally spaced, secure proper exhaust? The owner has purchased a 2 or 3-ton refrigerating unit for cooling, but we are not concerned with this.

L. L., Illinois.

Reply by The Editors

Paul R. Jordan's book "Ventilation Manual," referring to pool halls recommends 80 cu. ft. per hour for each square foot of floor area for this type of occupancy where conditions are not too bad. If smoke and heat is bad, he recommends 160 cu. ft. per hour to each square foot of floor area, and for very bad conditions 300 cu. ft. per hour for each square foot of floor area. On this basis, you have 2,244 square feet of floor area, presuming that all of the floor is occupied and at 80 cu. ft. per hour, you would have to exhaust approximately 180,000 cu. ft. per hour or 3,000 cu. ft. per minute.

In removing such a large quantity of air, we suggest that you consider the following conditions:

- 1—If there are skylights in the ceiling, or if this room is directly beneath the roof so that you can cut openings above which you can install propeller type fan housings, you might be able to handle this volume of air with two propeller-type fans, so placed as to divide the length of the room into three equal spaces. We are doubtful if one fan, placed in one end will give you satisfactory results unless the condition is very bad at one end and not very bad at the opposite end.
- 2—A duct system would, in our estimation, be much more satisfactory and if you use a duct system, we would suggest four openings—one (to be the largest opening) above the entrance of the room where we presume you have a cashier's counter, tobacco counter, and where people probably gather, and the other three grilles to be spotted along the run of duct to divide the remainder of the floor into approximately four equal areas.
- 3—Since you are exhausting approximately 3,000 cu. ft. of air per minute, you will have to replace this amount of air and if you depend upon open doors and windows, you probably will have a high enough air movement and such cold air in the winter that the inflow will be objectionable. The 3,000 cu. ft. of air coming in may have to be heated before being admitted to the room.

American Blower Company, in their "Air Conditioning & Engineering" manual for pool halls recommend a 3 to 8-minute air change; in other words, from 20 to $7\frac{1}{2}$ air changes per hour. On the basis of a 3-minute air change, you would have to exhaust approximately 9,000 cu. ft. per minute and on the basis of the 8-minute air change, exhaust 3,500 cu. ft. per minute. This, you will note, is considerably higher than the Jordan figures for ordinary conditions and you will have to judge the quantity of air required according to the actual conditions.

We would like to suggest one additional precaution. You should remove the smoke from the topmost point in the room and high intakes are satisfactory for heat removal, if such is the problem in the summer. However, in winter high intakes remove the warmest air so you might have a second set of low intakes so that when the system operates in the winter you can leave a bank of warm air above the exhaust grilles and thus reduce the heat loss in the room.

Cold Air Construction

American Artisan:

We are having some difficulty keeping our forced warm air systems within the prices set by competition. Most of our competitors figure a return air duct as a main line from plenum to register and construct the line by panning the joist space. They simply drop the return air face or faces into the joist space.

From an efficiency standpoint is it recommended to use panned joist spaces or is it better to run a separate pipe from each return air face to the main return air line? We favor this individual branch method so that we can damper each return air face and regulate the amount of air taken from each room. Without dampering, our experience indicates short runs handle most of the air.

Reply by The Editors

The University of Illinois recommends the installation of dampers in all cold air returns for the purpose of balancing air collection from different parts of the house. These dampers can be installed as most convenient.

We do not believe that under present business conditions you can install a separate cold air return from every cold air register and there seems to be no objection to combining one, two or three cold air faces in one cold air return, providing the cross sectional area allotted to each cold air pipe is properly proportioned as the return approaches the furnace. Where more than one return face is connected to a return air main, a balancing damper should be installed somewhere between the face and the main.

A complete galvanized iron cold air duct is better than a panned joist space because it offers less resistance and can be properly sized, but in most houses, cold air returns are panned joist in order to conserve basement head room and eliminate ducts which can be satisfactorily handled by panning the joist.

On a gravity system, the pan should be pitched to the furnace by nailing a pitch strip to the bottom of the joist. This is not essential in a mechanical system where the fan causes air flow by suction. We suggest that all joist spaces be panned with galvanized iron and lined on the top and two sides with heavy building paper to keep the dust from sift through the floor into the duct and also to decrease resistance. We appreciate that this is not usually done.

According to all University of Illinois tests, panned joist spaces are perfectly satisfactory providing the area is properly proportioned and the space is enclosed tightly by sealing with adhesive tape or paper.

If competition is panning joist spaces, then we feel that you should do likewise as the advantages of complete return ducts are not great enough to offer many sales points.

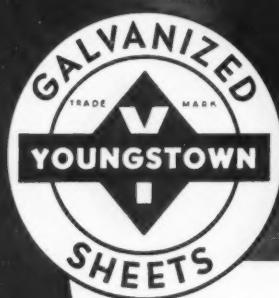
AMERICAN ARTISAN

SHEET
METAL
SECTION



DEVOTED TO SHEET METAL CONTRACTING AND FABRICATING

HOW MANY G.P.M. DO YOUR DUCTS CARRY?



★Conditioned air is moist air, carrying literally gallons of water through the duct work, and "How many gallons per minute?" is a fair question.

Leading heating and ventilating contractors, well aware of this water and corrosion problem, are providing ample protection for their installations and their business reputations by using Youngstown Galvanized Sheets.

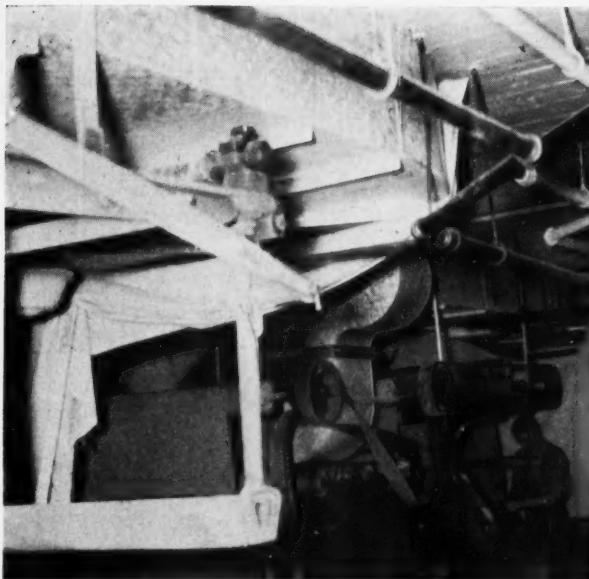
A ductile base metal, made especially for galvanizing, is thoroughly cleaned, and galvanized slowly to provide a

Sheets - Plates - Pipe and Tubular Products -
Conduit - Tin Plate - Bars - Rods - Wire -
Nails - Tie Plates and Spikes. 10-10B

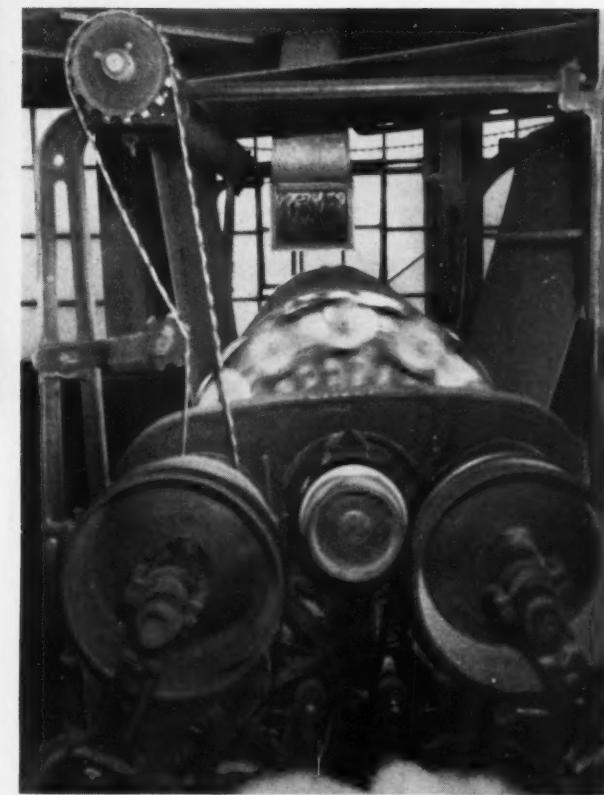
generous measure of zinc coating. As a result, Youngstown's Galvanized Sheets not only work well and form easily but also offer a full measure of continuous protection against the ravages of heat, dust, moisture, and corrosion.

For the sake of a job well done and for the development of more repeat business in the future, buy Youngstown Galvanized Sheets.

THE
YOUNGSTOWN
SHEET AND TUBE COMPANY
Manufacturers of Carbon and Alloy Steels
General Offices - YOUNGSTOWN, OHIO



Above—View of exhaust line along machine row and rear of one gooseneck which turns down into pocket of napping rolls. Right—Register view of the same exhaust branch. The picture shows the pocket between napping rolls where lint accumulation is heaviest.



Air Supply and Exhaust System For Blanket Napping Machines

THE Spencer Air Conditioning Company, Minneapolis, last summer remodeled and made additions to a ventilating and air conditioning system in the napping room of the plant of the North Star Woolen Mills Company to bring working conditions up to the standards required by Minnesota state health regulations. The conditions requiring improvement are in the wool napping department where the wool blankets, previously woven, are passed through "napping machines" which mechanically rough the blanket surface to make a wooly nap.

The napping room occupies the entire sixth floor. The napping machines, as the floor plan shows, are arranged alongside two outside walls. The original system took outside air, passed the air through a washer where pre-heat and re-heat coils controlled the temperature of the air introduced into the napping room. The washer and air temperature control also governed the percentage of relative humidity in the room. Under the old system a slight air pressure was built up in the room and this pressure was depended upon to force inside air out through windows, doors and cracks, thus maintaining some semblance of air change.

In winter, under the old system, the room air

was wholly or partially recirculated by pulling the room air through the open door of the mixing chamber ahead of the washer. As stated, the napping machines "rub" the nap onto the blanket and, naturally, much fine wool lint, dust and wool particles are loosened into the air by this mechanical process. Under the old system, where there was no mechanical exhaust, but only indirect exhaust because of inside air pressure, dust conditions in the room were not conducive to health or workmanship.

The remodeled system uses the existing supply system with the washer and blower. At present air from the fifth floor, where blankets are inspected, cut, sewed, packed, etc., is brought up to the supply system and after washing, heating, humidifying, etc., is returned to the fifth floor.

Blankets are bought by pounds weight. This weight fluctuates according to the absolute humidity. Industry standards specify a definite weight and maximum moisture content for a wool blanket, which is tested with air conditions in equilibrium with such moisture content. Blankets being shipped are carefully packed to avoid excessive loss of moisture in transit. Therefore, air conditioning is essential on the fifth floor. The system is now arranged to heat, cool, clean and

MISCELLANEOUS NOTES
MOVE ELECTRIC LIGHT OUTLETS WHERE
SAME INTERFERE WITH THE NEW DUCT WORK
MAKE SUCH CHANGES IN THE EXISTING
SPRINKLER PIPING AS ARE REQUIRED BY
THE NATIONAL BOARD OF FIRE UNDERWRITERS

REMOVE EXISTING FRESH AIR
INTAKE LOUVER. INSTALL NEW 48" x 42"
LOUVER AND SCREEN. ENLARGE WINDOW OPENING

Diagram illustrating the rear air flow system with the following components:

- 48" x 24" MOTOR OPERATED LOUVER DAMPER**: Located at the bottom left.
- 48" x 24" MOTOR OPERATED LOUVER DAMPER**: Located at the top left.
- NEW EXHAUST FAN**: Located in the center.
- MOTOR**: Located to the right of the fan.
- 48" x 30" MOTOR OPERATED LOUVER DAMPER**: Located at the top right.
- LOUVERE EXISTING FRESH AIR INTAKE LOUVER AND SCREEN**: Located at the bottom right.
- 42" x 30" MOTOR OPERATED LOUVER DAMPER**: Located at the very top.
- LOUVERE DAMPER**: Located at the far right.
- AUTO. BACK DRAFT DAMPER**: Located below the louver damper.
- DAMPER MOTOR AND FAN SWITCH**: Located at the bottom right.

EXISTING CONDITIONED AIR SUPPLY SYSTEM (SEE PICTURES)

RETURN AIR DUCT
IN FLOOR NOT
IN PLAN. CONNECT
TO 5TH FLOOR DUCT
EXTENDED BY THE
FIRE REAR

EXISTING FAN

AGAINST CEILING

RUN DUCTS STRAIGHT

BAROMETRIC INDICATOR UP 7'-0"

24' x 72' ACCESS DOOR

52" x 15"

50" x 15"

10" x 10" DROP

32" x 25" DAMPER-2 SECTIONS

20 x 66' ACCESS DOOR

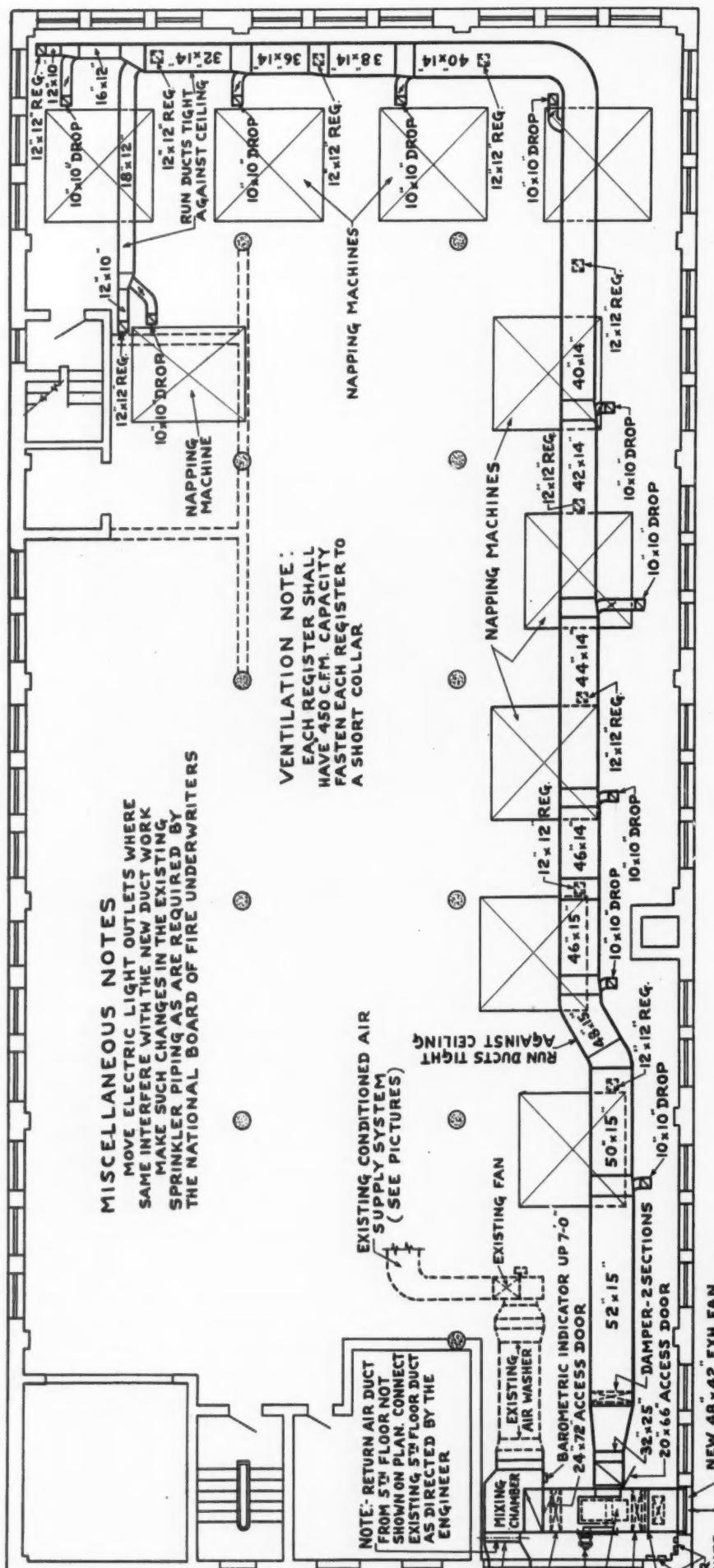
NEW 48" x 42" EXH. FAN

DISCHARGE LOUVER AND

SCREEN. CUT NEW OPENING

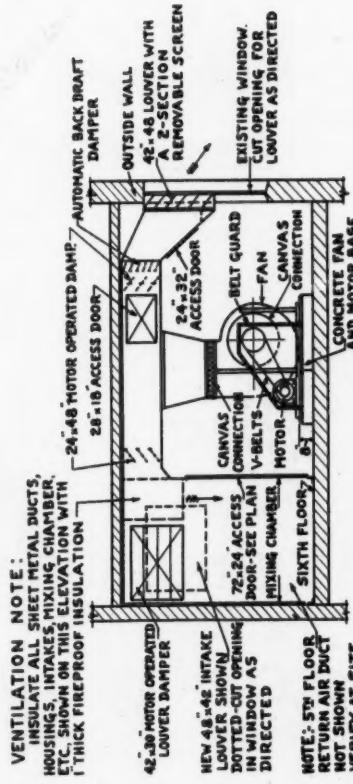
IN EXISTING WINDOW

VENTILATION NOTE:
EACH REGISTER SHALL
HAVE 450 C.F.M. CAPACITY
FASTEN EACH REGISTER TO
A SHORT COLLAR.

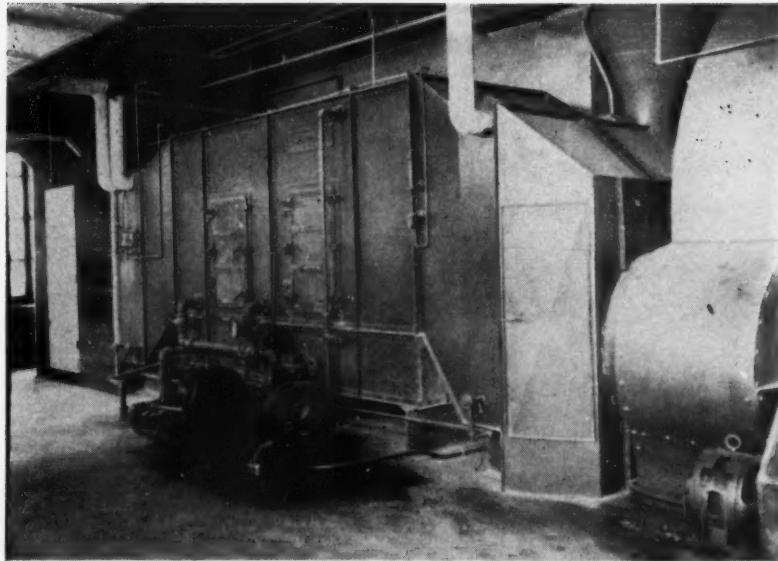


SIXTH FLOOR PLAN

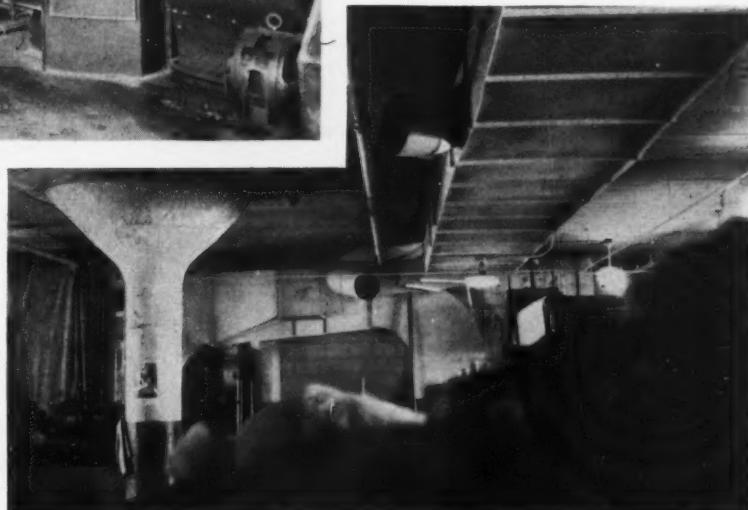
The plans and details on this page show the engineering features of the exhaust system, sizes of the duct sections and details which insure compliance with the special requirements of the processes in-



DETAIL OF TYPICAL 10x10" DROP

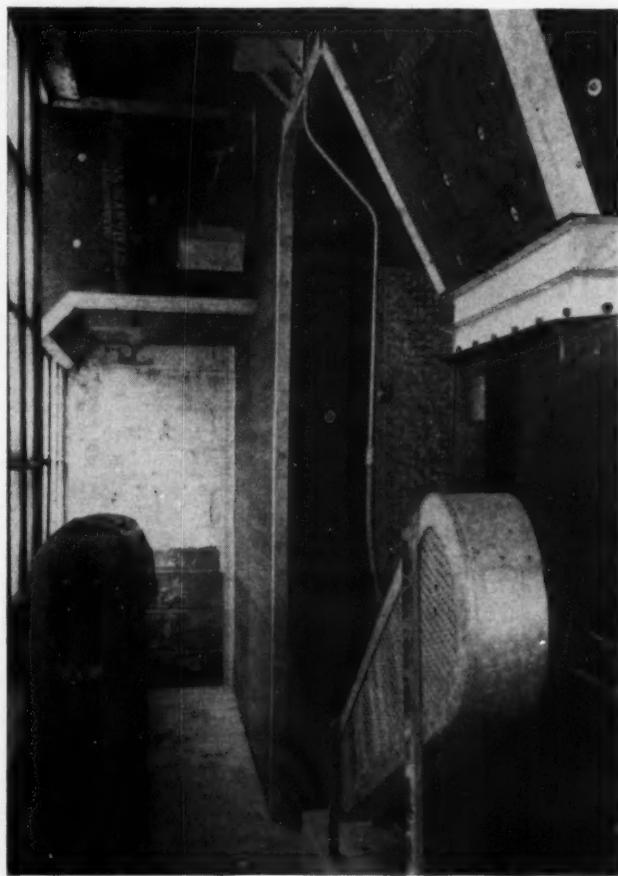


Left—Supply fan, air washer and air intake. This is the original system. Below is a view of the supply system showing nozzles which direct conditioned air towards machines. At bottom of page—Insulating on outside air intake, exhaust to outdoors and the mixing chamber.



maintain a constant absolute humidity required for the finishing process.

The sixth floor supply system was left in place without major alteration. Although not shown on the floor plan, one of the photographs shows the supply line down the center of the sixth floor. Along the line, at a point opposite each napping machine, a stub nozzle is pointed toward the napping machine. The air, either recirculated or from outside, heated and humidified, is discharged in the direction towards the napping machines.



The new exhaust system runs alongside and above the napping machines. A total of 10,770 cfm is exhausted from the room through ten machine nozzles and ten openings in the bottom of the main duct. (See plan). The exhaust is controlled so that 800 cfm is exhausted through each machine grille and 300 cfm through each main duct grille above the work floor area. The photographs show these machine grilles which are dropped down so that the face looks directly out over the trough between the two top rolls of the machine. In this pocket the dust count is heaviest, accordingly, the system is intended to catch most of the dust very close to the source. The exhaust grilles along the duct catch any dust which gets free from the machine pocket and out into the working area.

Theory of System Operation

The theory of the two systems then is—the supply system discharges heated, washed, cleaned, and humidified air directly towards the pocket between rolls where dust count is heaviest while the exhaust system pulls this air from the pocket into the exhaust system where the air is either exhausted to outdoors or is recirculated by being passed through the washer for cleaning, or a proportion of both, depending upon the season.

The operation of the system can be understood from the notations on the floor plan. In summer, all outside air is taken into the washer where the air is cleaned, humidified and passed into the

(Continued on page 63)

Improper Seaming Causes Roof Failure

By Lawrence E. Gichner

Gichner, Inc., Washington, D. C.

ONE of the solemn shrines of the American people is the Tomb of the Unknown Soldier. Here thousands daily pay silent tribute to the symbol of the Nation's World War dead. A guard of honor, with measured tread, marches up and down, up and down, every minute, of every day, of the year.

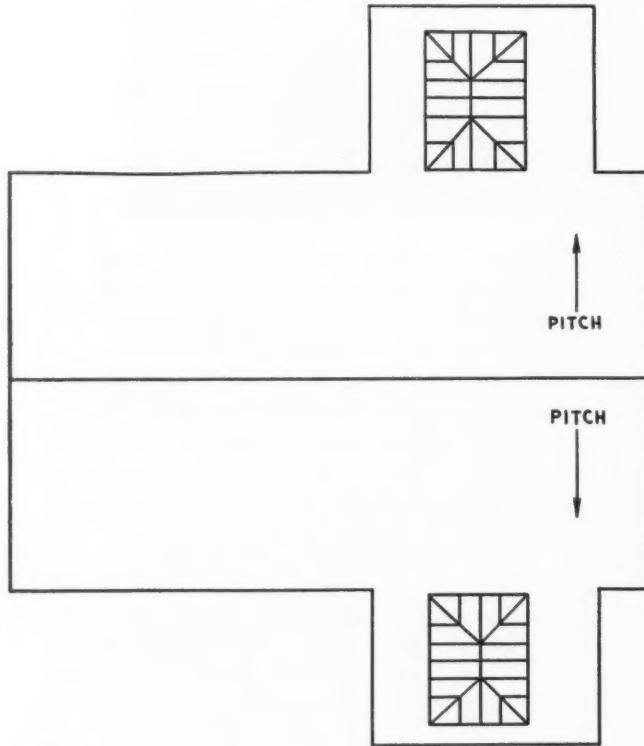
But the copper roof on the Reception Building, Memorial Amphitheater, Arlington National Cemetery, Fort Myer, Virginia, leaked.

"Confession of ignorance is, sometimes, valuable

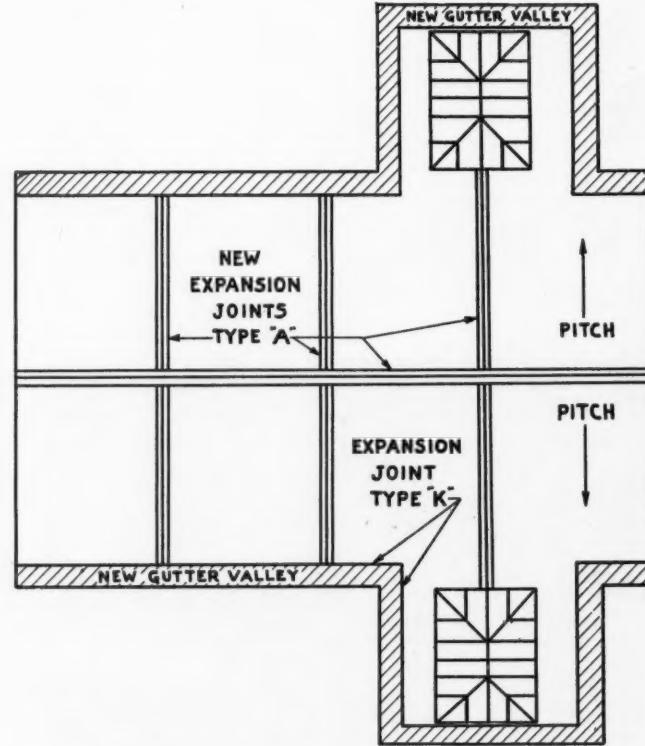
information," said Benjamin Disraeli and we may paraphrase this truism of the great English statesman by stating that the knowledge of why a roof fails is always definitely valuable information.

But at first study, the "Why" of this particular roof failure was not such an easy matter to answer.

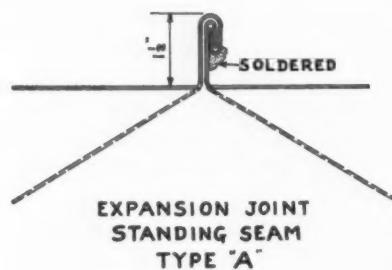
In this monumental marble building which contains the medals, bronze wreaths and gifts of reverence and respect from the entire world, to the sainted soldier, this water drippage was a minor catastrophe.



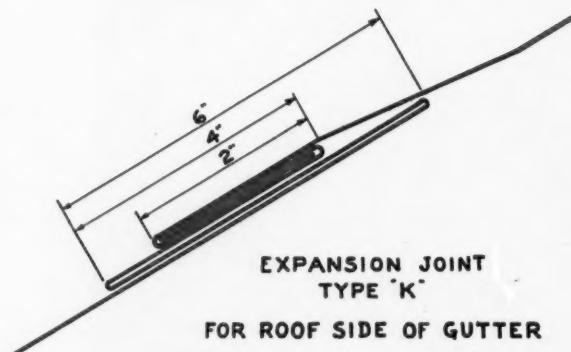
ROOF AS ORIGINALLY INSTALLED NO EXPANSION JOINT



ROOF AFTER EXPANSION JOINTS INSTALLED



TYPES OF EXPANSION SEAMS USED ON ROOF OF RECEPTION BUILDING
MEMORIAL AMPHITHEATER ARLINGTON NATIONAL CEM.



In less than twenty years since its installation, copper, the metal of the ages, seemed to be causing trouble. Close scrutiny revealed that in only a few minor instances was the metal in poor condition. It was the seams that were giving away. These seams had been frequently repaired and piled high with solder.

Microscopic examination revealed that here was the chief source of the problem. The sheets had been pre-tinned a more-than-ample distance before application, but the error arose from the application methods of those who installed and soldered the sheets. The solder had an adhering surface, in many cases, of only an eighth of an inch. This was due to one of two things. Either the soldering coppers were too small to hold and give off the necessary heat or large irons were used and the mechanics too quickly skinned their irons along the surface allowing no time for the heat to penetrate and "flow" the bonding solder.

◆

At right (from top, down—1—Old, water soaked battens could be shredded with the fingers. 2—The old gutter was taken up and new felt was laid under the roofing. 3—Cleating the sheets of the new gutter. Cleats were applied on the long side only to permit movement. 4—Soldering the new expansion joint in the gutter. After soldering the seam was straightened up. 5—All flux was carefully removed with a damp cloth and warm water.

Below—The old expansion joint at the juncture of valley and roof showing how seams opened up despite repeated piling on of solder and the new stand seam expansion joint which is much larger than the old.





This carelessness in soldering necessitated melting off the old solder, opening the seams, raising the sheets, thoroughly cleaning the seam, re-tinning, and then sweating shut all seams. "Unless this is done roofing seams will never hold", says Kendall Graham, a competent young man with a wide range of experience in copper roofing. Mr. Graham supervised the repair and new installation for Gichner Inc.

Accompanying illustrations show that in spite of solder being piled high the seams split open.

A second cause for failure was discovered when inspection disclosed no provisions made for expansion of the metal.

In Washington, the summers are intensely hot with frequent thunder showers in the afternoon which quickly drop the temperature many degrees in a few minutes. This rapid change places a severe strain on the copper. Originally no provisions were made for this movement, and on certain days, under certain atmospheric conditions one could hear the action of cracking copper for many minutes.

◆

Left (from top, down)—1—In spite of repeated piling on of solder, the old seams split open. 2—The copper rolled back to show the very small cleats (iron nails). Note that cleats were placed on both edges which prevented movement. 3—Using a blow torch to open up the old seams and allow removal of old solder. 4—An old seam opened up and solder removed. 5—The old sheets were re-tinned and seamed in rolls and brought back to the roof for re-laying. Below—The new and the old gutter. In the new gutter note the high, upright joint and the flat expansion joint where roof joins gutter. The diagram on the first page shows the construction of this flat expansion joint.



The methods followed to remedy the trouble can be quickly explained. One course of metal was renewed at the ridge and an expansion joint installed along the ridge. Each slope of the roof was divided into four areas. At each division an eight inch strip of metal was cut out and replaced by an expansion joint.

The expansion joints were made with a hemmed seam at the top to provide stiffness and strength and to insure protection should some careless person step, or an object fall, on top of the joint.

Fortunately the original sheets were cleated only on the long side and not all around. Cleating a sheet on the short side is decidedly wrong because it restricts movement in expansion and contraction. Sheets therefore should definitely not be cleated all around and only on the long sides.

Another error made in the original roof installation was that the cleats were nailed with iron nails. All the nails were rusty and where water had penetrated the nails had in many instances completely disintegrated. The roof itself is concrete or a similar nail crete composition. The surface was regular, smooth and in fine state of preservation.

In the valleys wooden battens had been originally imbeded in the cement and used as an anchorage for the cleat nails. In areas that leaked the battens had become water soaked and one could shread them by the simple pressure of a finger.

The valley gutters were completely renewed to a width of five feet. The new material provided two expansion joints and allowed for the free movement of the copper on each of its three surfaces. Where the metal abutted the balastrade it was slipped high under the cap flashing and left loose to move easily with the exception of an intermittent solder tack that held it together.

At the bottom of the gutter a standing seam expansion joint was installed. The seam was locked, hemmed at the top, malleted down in order to facilitate soldering and after soldering, straightened.

A double "S" type expansion joint was made where the roof joined the gutter. It was formed from a 15" wide 16 oz. soft lake copper with ample material laped up under the old roof to provide additional waterproofing. The existing deck was just hooked to this expansion joint without soldering. Thus it can move freely; allow no occasion for splitting, tearing or opening.

The gutter was constructed of this 15" wide 16 oz. soft lake copper expansion joint two 18" wide strips (made of 18"x24" copper assembled on rolls in the shop) and a 24" strip of (24"x96" sheets) which composed part of the standing seam expansion joint, and also the base flashing.

The roof was fastened with 1" x 3" copper cleats held by lead sleeves and brass bolts. The cleats

were pretinned, providing, when soldered, an integral strong tight bond with the roof.

If the cleats are not tinned, they do not become bonded to the roof and leave a potential area from 1" to 2" on every sheet that can cause trouble.

In spite of the fact that a prepared flux was used for soldering, surplus residue was quickly removed with a damp cloth:

A layer of rosin sized red building paper was secured to the roof separating the cement deck from the copper. The old roof, because of the many completely decomposed nails, came up very easily. The original cleats in the opinion of the writer were too small to be adequate. Occasionally a cleat was found on the short side, but not frequently. In

(Continued on page 63)



From top, down—1—Soldering the ridge strip to the roof. Note new roof expansion joints. 2—Cleaning the seams with a wire brush before soldering. 3—The completed ridge showing side expansion joints and method of joining roof and ridge expansion joints.

Collectors For Jewelry Buffing Wheels

By J. W. Baybutt

Rochester, N. Y.

PROBABLY the simplest form of dust collecting system to handle the dust specified, for a small shop, would be as shown on the attached sketches marked I, Ia and Ib. Each state, of course, may have its own particular rules and regulations, but if a close fitting hood is used with a 2-inch water suction at the pipe connection, very little dust will escape. The type of work to be done will possibly affect the design of the hood, but the operators should be cautioned to keep their hood flaps closed if they want to breath the cleanest air.

The piping as shown is sized for a reasonable length of run but if extremely long runs are encountered, it would be well to step up pipe sizes a size or two. The fan speed and power will also change

dependent on the piping size, but the data given in the sketches will cover most installations.

While the velocity may drop at the extreme end of the line when using a larger pipe than called for, it is practically impossible to maintain the required 2 inch suction on the end without throttling the branches near the fan. Some metal contractors would prefer to make one taper for the main, that is start with an 8 inch pipe and increase constantly to the 12 inch pipe. A few engineers prefer this, but the method requires a little more close layout work than the straight transfer pieces and may cost more.

A 12-inch inlet exhauster with standard wheel should handle the required amount of air for this job when running at 1750 rpm. This allows a direct-

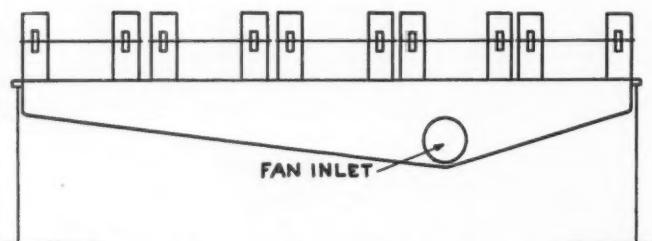
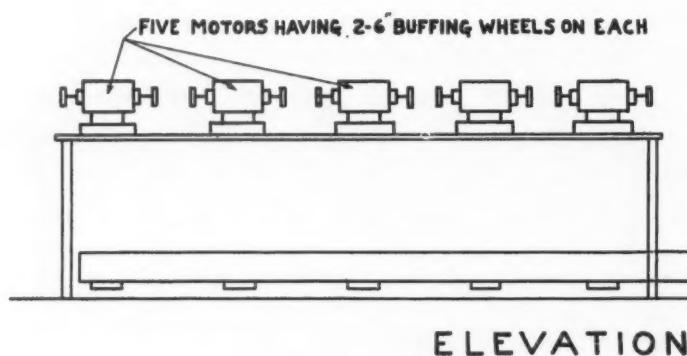


DIAGRAM # II - FRONT VIEW



ELEVATION

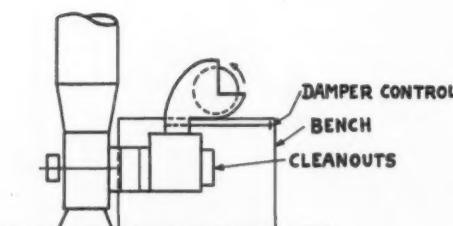


DIAGRAM # IIa.
CROSS SECTION

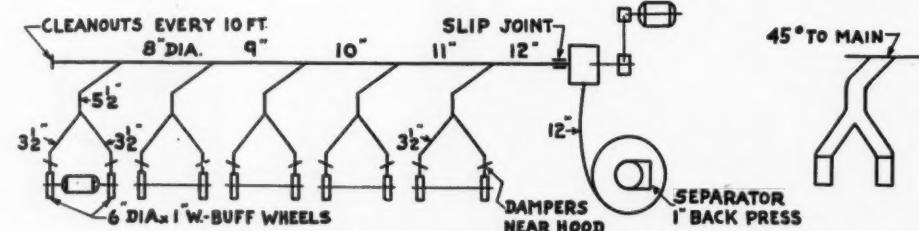


DIAGRAM # I - PLAN

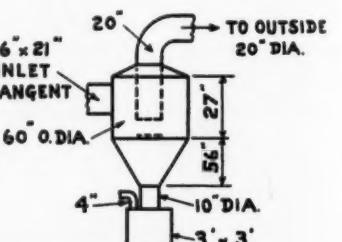


DIAGRAM # IB
DIAGRAM OF SEPARATOR

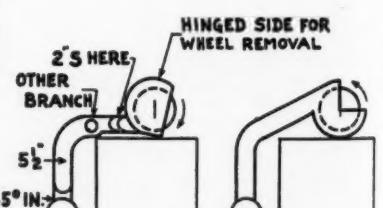
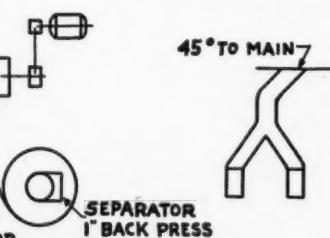


DIAGRAM # IA
DIAGRAMS OF HOOD



connected standard speed motor if readily available, but most authorities probably prefer a more flexible, belted unit, if new equipment has to be obtained. The air volume should be about 250 cfm for each hood making a total of 2,500 cfm for the ten wheels. In the extreme south, the heat requirements for this air loss will not be unreasonable so contractors will probably be allowed to discharge the total volume to the atmosphere without replacement by heated air. Any valuable materials could be salvaged more completely by passing the air from the separator through a cloth or paper filter before discharging the air to the atmosphere. The

fan speed and motor size will have to be stepped up for this additional equipment, however.

Sketches No. II and IIa show another method of providing the necessary exhaust requirements. This scheme will not fit all layouts, but might be a solution for some jobs. The air flow capacities will be the same as suggestion one with the same fan-separator, etc. Under the bench is likely to be the least valuable space so why not put the main duct there? Accessible cleanouts would have to be provided with this scheme. The center location of the fan will keep down the line friction and should be used on all installations if possible.

Exhaust System for Blanket Napping Machine

(Continued from page 57)

room through the supply system. Dust laden air is pulled into the exhaust system and exhausted outdoors. In winter, the outside air can be controlled as to volume, according to the outside temperature and relative humidity. Any desired proportion of outside or recirculated air can be obtained by adjustment of the fresh air intake, and recirculating air dampers shown on the plan. A manual automatic rheostat switch controls the dampers for outside, and recirculated air. The motors of the dampers are synchronized so that as outside air volume is adjusted, recirculated air volume is proportioned accordingly.

The exhaust air opening, as the plans show, is equipped with back draft dampers so that outside air is shut out when the supply and exhaust systems are shut down. The fresh air intake damper automatically comes to a closed position when the system is shut down. Operation of the system showed that the dust and lint is so fine that little dust sticks in the duct system. However, cleanout doors are installed along the duct to allow cleaning, if necessary. In winter, when air is largely recirculated the washer water must be drained and cleaned every day.

The photographs show that the ducts which connect to outdoors, and the mixing chamber, are insulated with one inch of rigid insulation. In winter it is assumed that the galvanized iron of these ducts will become cold through contact with the outside air, so, to prevent condensation from the humidified air indoors, the ducts and the chamber are insulated.

The Spencer company had to install the new system during a short holiday period last summer when the plant was shut down. Measurements for the duct sections and for the fittings required were made on the job. Duct sections were then fabricated in the Spencer shop, numbered and assembled as complete sections and delivered ready for erection. Straight sections are all 4 feet long. The branch take-offs are taken out of short duct sections, sized according to the particular machine and its location. As the plan shows, some of these

branches drop straight down and turn inward; some have to carry a short distance toward or away from the duct in order to get the pocket between rolls. Each branch, therefore, was especially fabricated for its particular machine. One of the details shows a typical branch, with two elbows and the damper which controls the air volume.

The exhaust openings into the roll pockets, are fitted with heavy gauge, diamond mesh screen faces, with dampers, and quadrants in the drop ducts for adjusting air volume.

The openings in the bottom of the main duct are fitted with key operated multi-shutter type register faces of the square lattice design.

The consulting engineers on this work are A. D. Martino, and E. E. Herbacek, of Minneapolis, Minn.

Improper Seaming Causes Roof Failure

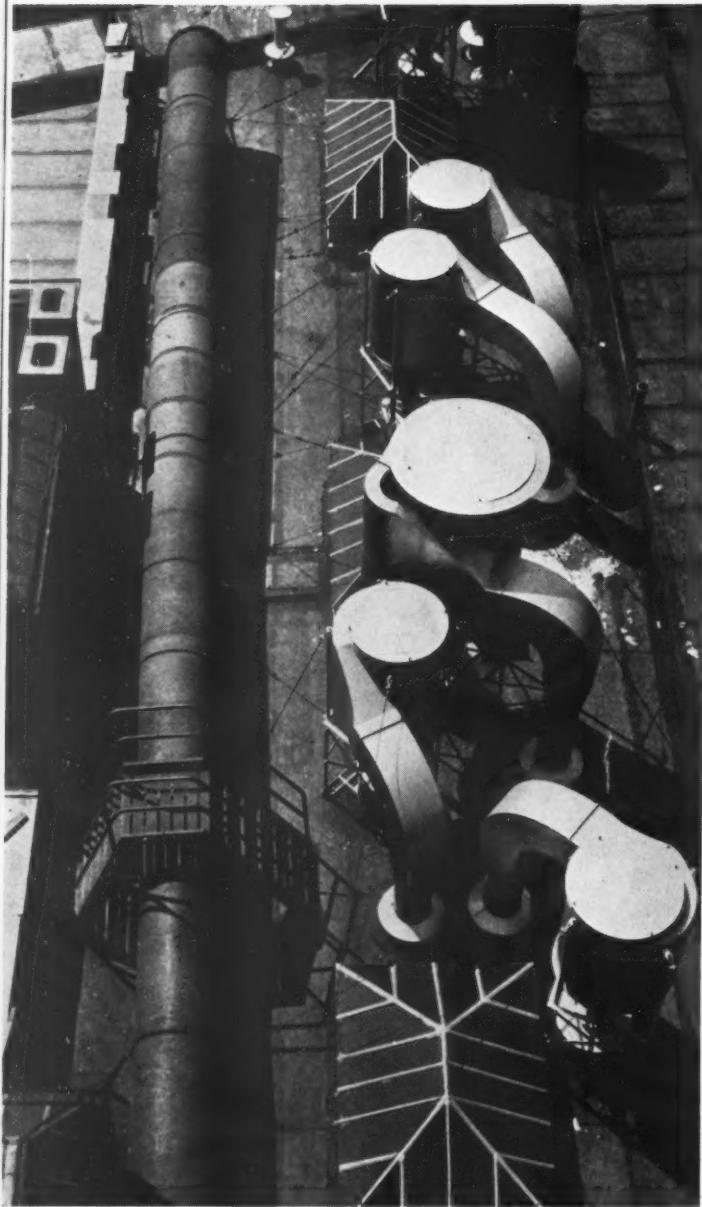
(Continued from page 61)

many sheets iron nails were driven in the lapped part of the corners, evidently to facilitate fastening during installation. This mutilation does not contribute to the best results.

All new expansion joints were hooked or soldered to the adjoining metal, left comparatively mobile and not cleated. Cleating defeats the end for which they are intended.

The roof drained through iron pipes in the wall of the building. The gutters and iron pipes were connected with a 16 oz. copper mouth piece projecting into the drain. It has sometimes been a practice to use 20 and 24 oz. copper on the mouth piece, but it has been found that because of the difference in the coefficient of expansion and contraction between the two weights that they tear where they are joined. It is therefore advisable to use the same gauge throughout a job, wherever possible and practical.

The mechanics considered the monumental significance of the structure and took exceptional pride in working on the building. They exercised their best skill in making repairs whose lasting qualities will be proven by time.



The large Monel main at the left collects the fumes and hot acid laden gases from the system described and conveys the gases to the chimney. The individual collectors at the right serve another battery of roasters.

A STRIKING example of the use of 16-gauge Monel to meet successfully the inroads of acidulous vapors plus moderately high temperatures, is illustrated in the installation made some time ago by Jabez Burns & Sons, New York City, of an unusual ventilation system in a local coffee roasting and bagging plant. An understanding of the problems encountered in such an installation emphasizes the value of proper materials.

Briefly, the sheet metal contractor recognized that the heating fuel gas, always means high humidity and certain acids of a sulphurous nature in the products of combustion. These had to be removed. Then, too, coffee in roasting gives off additional moisture, plus fumes of an acetic acid content. The combination, in the past had given the plant owner plenty of trouble in rusting out the sheet metals of the ventilation system.

Failure of previously used metals resulted in fre-

Fume and Gas Removal in a Coffee Roasting Plant

By R. C. Nason

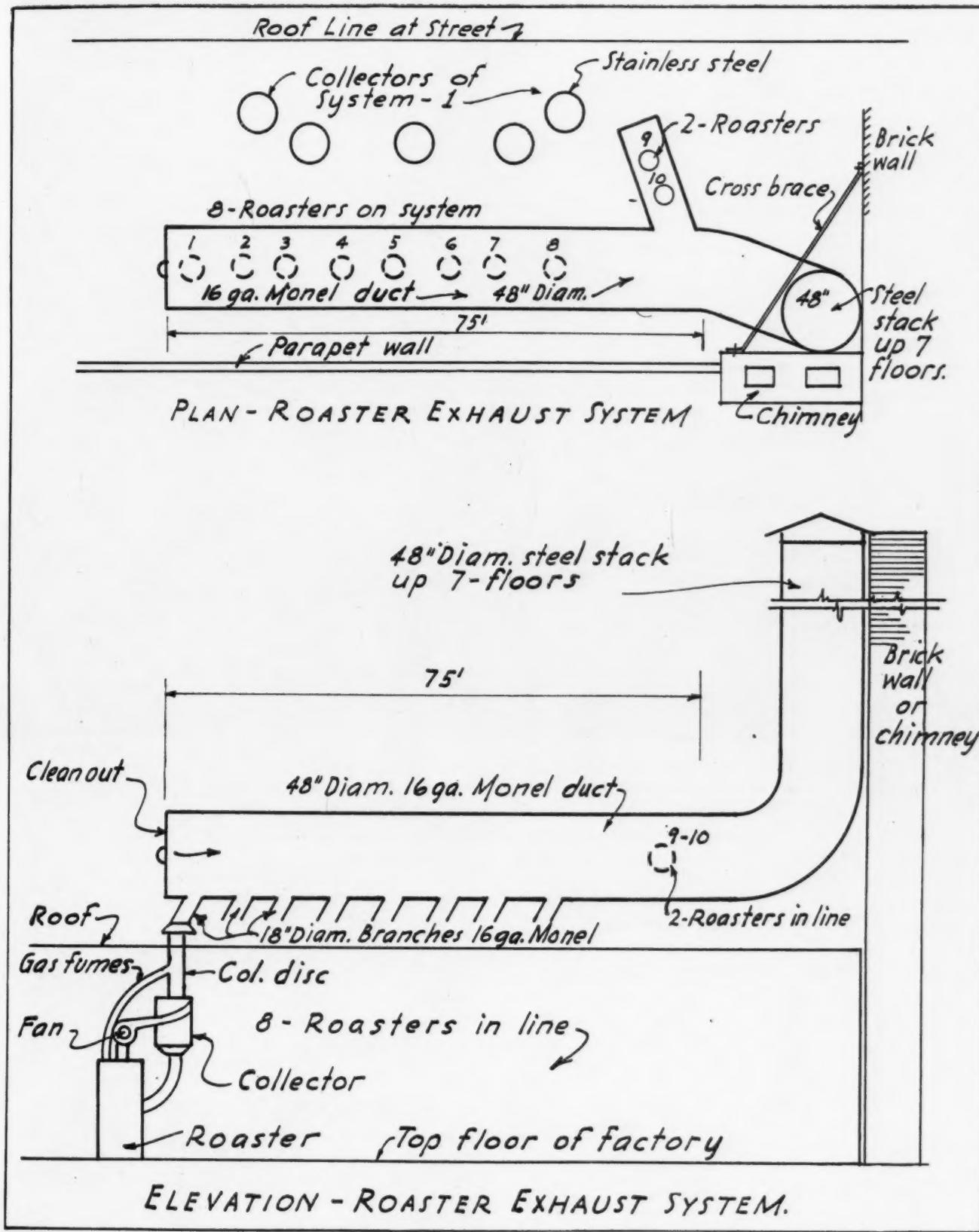
quent repairs and renewals, two factors that were objectionable in the busy processing plant working under a heavy schedule. When leaks developed, neighbors and city health officials protested. The obvious answer was a more suitable metal of heavy gauge. For these reasons the contractor installed Monel, with certain sections of stainless steel, seven years ago and no leaks or other difficulties have occurred since.

In this roasting plant, there are 10 roasting machines, or ovens, on one system and five machines in another group of roasters. The combined gasses released show about 85 per cent relative humidity, 400 deg. Fahr., and an acid content of the nature already indicated. The manufacturer of the roasting equipment, also the sheet metal contractor in this instance, regularly furnish with their roasters individual cast iron cased exhausters. These roaster fans carry off the heat, moisture and fumes and make working conditions bearable for workers, particularly in summer, for processing occurs during every working day the year 'round.

General Collecting Plan

The individual exhausters and ducts adjacent to machines first pass their discharge to small collectors situated above and immediately adjacent to machines. Air-delivery ducts then pass directly up through the roof and enter the bottom of the large lateral main shown in accompanying illustration. Branch ducts, 18 inches in diameter, join the main pipe at 45 degrees in the direction of flow. The main is 48 inches in diameter and 75 feet long. (See photographs)

Just above the roof each branch riser has a "draft hood" that flares away from the branches 3 inches all around and also protrudes internally $1\frac{1}{2}$ inches, referring here particularly to the branches which enter the large main as shown. This "collar" arrangement provides fume impingement so that, air velocity being interrupted, condensate is deposited on the under sides of the "collars." Drainage of the



Plan and elevation of the newest system. Each roaster has an attached separator. From these separators ducts lead to the main on the roof. The text explains the method of bracing and supporting the stack.

captured moisture then occurs by flow to the outside rim of the collars where it drips to the roof for final drainage to the sewer.

Joints in the branch risers over the section between roasters and the main are welded. Sections of the main, 4 feet long, each, overlap 2 inches, cir-

cumferentially and are close riveted with Monel rivets and tack welded every 6 inches. Section seams, longitudinally also overlap 2 inches and are close riveted. All joints, in both directions, then were calked with mastic of permanent softness. No paint was applied.



Closeup of the Monel main with leaders from the roasters on the floor below. Erected in 1932, this system shows no effects from fumes, acidulous vapors, high temperatures or the weather. Note individual draft diverters in each leader.

Ultimate discharge of the air occurs at another roof seven floors above. The stack is of 16-gauge steel, riveted construction. The stack rides in the angle formed by an old brick chimney and the wall of an adjacent building. Every 10 feet there is an angular cross brace of 2-in. band iron toggled to the walls, left, and to the chimney, right. Additional support consists of a structural steel frame based on roof timbers, also a roof supporting steel frame. The lowest cross brace is bolted to the basic support, while the top cross brace is bolted to the roof support. The cross braces prevent outward sag, while weight of gravity is met by base and top steel supports of the type indicated.

Main Pipe Construction

The large Monel horizontal main also is braced securely against rolling from wind pressure. Every 10 feet there are $\frac{1}{2}$ -inch solid steel rings surrounding the duct. To them are bolted other branches set outwardly against roof timbers at about 35 degrees. These are of 1-in. steel pipe flattened at the ends, one end being bolted to the circular rings, midway, while bottom brace ends are angled to lie flat on the roof. Bolts that hold these bottom ends to the roof timbers are covered with roofing com-

pound to protect them against corrosion.

One of the accompanying photographs shows at the right, five large centrifugal collectors of lighter color than the older metal of the horizontal duct at their left. The workmanship evidenced in the construction and design of these stainless steel collectors would indicate equally as long and as satisfactory service from the new units which also remove humid, acidulous gasses from roasters and their burners. Air discharge of the group of five collectors occurs around the periphery of lids, separated from the body of the separators 6 inches.

Back Draft Diverters

There are also backdraft divertors on the vertical risers to collector inlets. Unlike the older equipment, moisture discharge through the collars to the roof is absent. Air discharged downward through the bottom outlets of the collectors is recirculated, while solid matter, when present, is collected in special water scrubbing apparatus. These collectors, are braced by vertical members which serve as upper anchorage points for the $\frac{1}{2}$ -inch wire cables that help support both the newer collectors and the large main. Other sets of guy wires on the street side, provide additional support.

SHEETS... and all other Steel Products In Stock . . . for Immediate Delivery



When a man's in a hurry for steel, he gets Immediate Action at Ryerson. Large and complete stocks of bars, angles, channels, hoops, bands, sheets, plates, tubing, stainless steel, rivets, welding rod, etc., are on hand for Immediate Shipment. Up-to-date cutting and forming equipment, and speedy dispatching and shipping methods assure accuracy and prompt delivery.

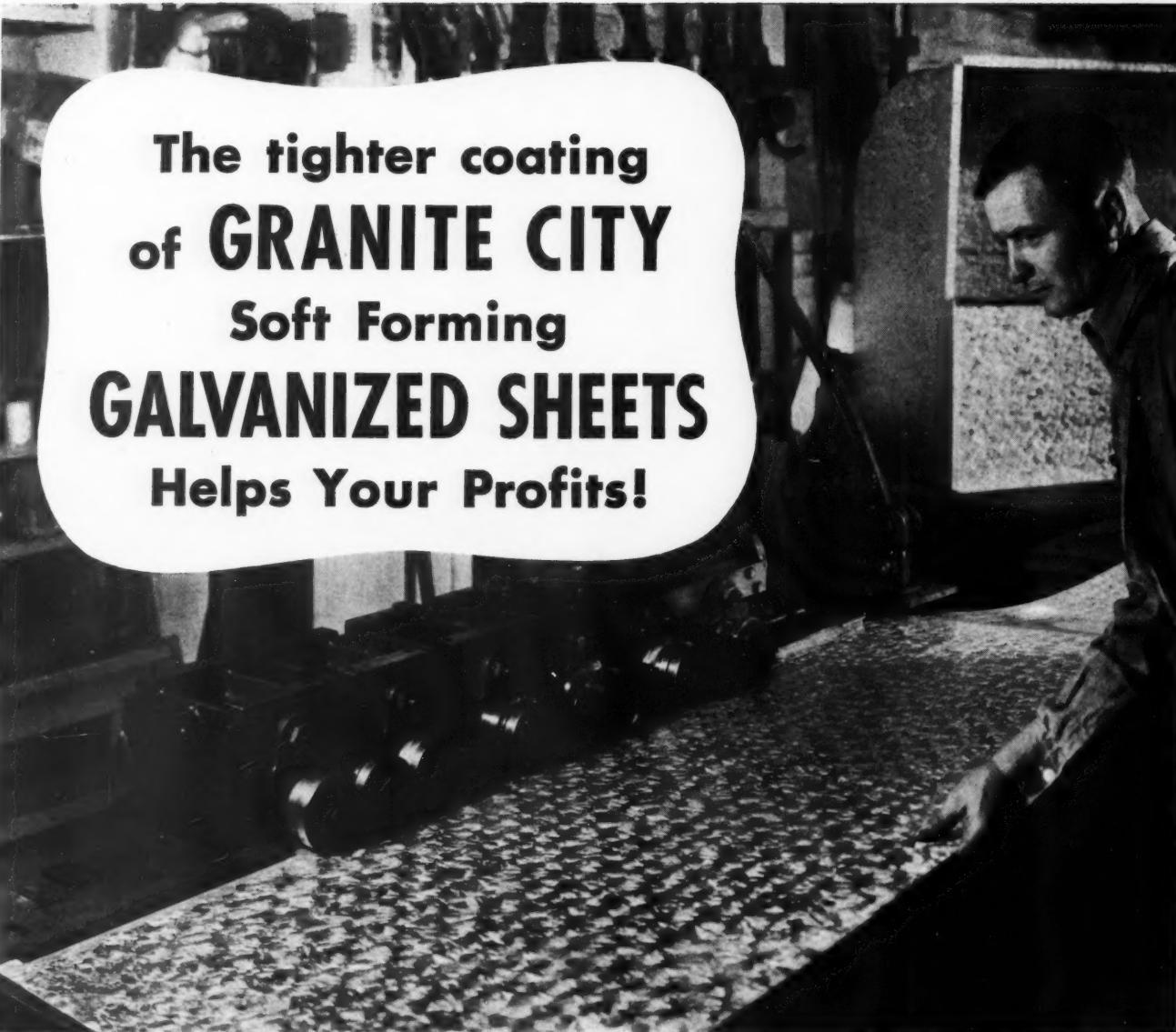
Ryerson sheets (there are more than 25 different kinds) are of uniform high quality and excellent workability. All are carefully selected for finish, flatness, gauge and size accuracy. No seconds are ever carried.

You will save time, trouble and money by concentrating all your steel requirements with Ryerson. Write for Stock List.

Joseph T. Ryerson & Son, Inc. Plants at: Chicago, Milwaukee, St. Louis, Cincinnati, Detroit, Cleveland, Buffalo, Boston, Philadelphia, Jersey City.



RYERSON STEEL-SERVICE



**The tighter coating
of GRANITE CITY
Soft Forming
GALVANIZED SHEETS
Helps Your Profits!**

Bad flaking during double seaming or other severe forming operations means rejects and unsatisfactory work. You can quickly remedy this situation by a switch to Granite City Soft Forming Galvanized Sheets, which will bring you faster production, highest quality workmanship, satisfied customers and *greater profit*. It has been the experience of sheet metal workers everywhere.

Your men will like the easy forming of Granite City Galvanized Sheets, the evenness and tightness of the spelter, and the accuracy of gauges and sizes. Your customers will like the neat appearance of the finished work and its bright, even spangles.

Specify Granite City Soft Forming Galvanized Sheets on your next job. Available in regular grades, or copper bearing steel which offers maximum protection against corrosion. Write today for more information and sample sheets.

**Chicago • Cleveland • Denver • Indianapolis • Kansas City • Los Angeles • Louisville • Memphis
Milwaukee • Minneapolis • Moline • New Orleans • New York • St. Louis**

**GRANITE CITY
STEEL COMPANY**



GRANITE CITY, ILLINOIS

1922

Help Wanted

My dear Customer:
I find that as the busiest furnace season of my time is approaching, that I need more help in various capacities, such as salesmen or saleswomen, canvassers and solicitors, in either sex, boys and girls, all of which leads up to becoming REAL salesmen and earning real money.

I especially need canvassers and salesmen at this time, either whole or part time. If you or any of your family or friends wish to try in your own neighborhood, I'll be glad to give you any assistance possible.

I also need boys and girls in every section of the city to go around and find prospects and turn them in, thereby greatly assisting me and not only earning some money for themselves, but I think it to be one of the best character builders that has been offered to them.

We desire to get all our help from people who are familiar with the Caloric Pipeless or Pipe Furnace, or Monitor Pipe or Pipeless or Monitor Cabinet Clothes Dryer. I hope to steadily strengthen and build up my organization are inexperienced. Your ambition and friends, even though they are more lack of training along this line.

Trusting I may hear from you when in need of employment, and remember there is no limit to your earning power in this organization, except from your own indifference or lack of ambition.

You may call, write or phone.

A. R. HARRIS,
The Furnace Man.

1325 Brandon Avenue, Chicago Phone: So. Chi. 9748.	RESIDENCE: 13328 Garfield Ave. (Hegewisch Station.) Chicago. Phone: So. Chi. 9704.	260 Hobman Street, Hammond, Indiana. Phone: Hammond 3023.
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Two of the first mimeographed letters.
These were distributed by hand or mailed.

For Ten Years—Almost Every Week— A.R. Harris Has Advertised to His Neighbors

FOR ten years, A. R. Harris, furnace and sheet metal contractor of Hammond, Indiana has persistently advertised to his customers and prospects. In this time, practically every media has been used—newspapers, radio, direct mail and hand bills. And out of the methods tried, the personal message, delivered to the house, has been most favorable.

A. R. Harris is not a "big" contractor. The method he uses is not "big time" advertising, except in volume, and is applicable by the smallest shop. The requirements for such a campaign are a willingness by the contractor to prepare timely messages, a sum of money sufficient to employ boys to distribute the cards, and either a mimeograph machine or a source of supply.

The Harris campaign, in the beginning, used mimeographed letters, on which a timely message, couched in friendly terms, was addressed to the home owner. In spring and fall these letters talked about furnace cleaning, repairs to the furnace or the drainage system; during the heating season, particularly in bad weather, the messages explained

the benefits of forced air circulation, air cleaning, proper humidity; at other times the engineering service available to new home builders or owners making alterations was explained.

In every message, the general tone was chatty, friendly, just as though contractor Harris was talking face to face with the owner. This friendly tone is thought, by Mr. Harris, to be the keynote to the acceptance.

Harris operates in a manufacturing district. In the area are numerous small towns, some strictly manufacturing; others strictly home districts. In the area there are, according to records, some 25,000 single family houses. The campaign has been planned to reach about 10,000 homes a month, so that every owner in the area receives a message about once every two or three months.

Harris has his own mimeograph machine. A stencil lasts for about 10,000 messages so it is necessary to cut a new stencil each month.

For the last few years, the message has been printed on small 3 1/4 by 5 1/2-inch cards. The cards cost about \$1.00 per thousand and, using his own

1923

A. R. HARRIS

The Furnace Man
Heat And Ventilate With Modern Forced Air

Residence: 13328 Garfield Ave.
Hegewisch Sta., Chicago
Phone: South Chicago 9704

Office & Salesroom: 4540 Hobman St.
Hammond, Indiana
Phone: Hammond 3023

Dear Friend:

You hardly ever hear of anyone being frozen to death nowadays, & but during the months just past there were thousands of people who were half-frozen most of the time—just because the old heating plant would not come through no matter how hard they coaxed it.

Perhaps you were one of the unfortunate. Were you forced to close off certain rooms in your house in order to keep other rooms warm, or could you go from room to room in perfect comfort?

We want to bring these things to your mind, now that you have laid away the coal shovel for another season. Why not get the old heater repaired or replaced with an honest-to-goodness furnace now—instead of putting it off?

This is the best time of the year to do it. We want to keep our men busy during the summer months—we are in a position to give a more attractive price with better workmanship now than later.

And you can do it now without considering the investment problem. You can make a small initial payment, get the work done ~~you~~—and then pay the balance at so much per month. This arrangement is provided through a liberal financing plan.

You have everything to gain under this plan. And when the job is done you can enjoy your summer vacation in peace. Another worry off your mind—because you cannot do without warmth next winter.

My salesmen will be glad to give you full particulars. Pick up your phone and call Hammond 3023 or South Chicago 9704, A. R. Harris.

It pays to have a warm home when it's cold outside.

Sincerely,
A. R. Harris

Note: We give estimates and draw plans for your new or remodeled home.

Dear Friend: Because by competitors have told I had died, moved away, quit business, and what not, I had undertaken to visit all my customers, but find it impossible before Fall, so am signing this card to show I am still alive, still doing business at the same address from which I have served people in the past 20 years. We do Heating - Repairs and Vacuum cleaning - Smoke Pipe - Ventilating, and Sheet Metal Work of all kinds.

4548 Hohman Avenue
Hammond, Indiana
Hammond 3023

15328 Carondolet Ave.
Chicago, Illinois
South Chicago 9704

A. R. Harris

Over a period of some 25 years, I have made many friends in Lansing & Oak Glen communities that I am proud of, not only from a financial stand point, but more particularly from a social angle, ranging from the 1st pipeless installed for Charles Miller in what now is lumberyard property and is still in use. To the modern duct system, air-conditioned, filtered, automatic controlled heating & cooling system, which is in the M. E. Church. Attend church and enjoy services in such pleasant, comfortable surroundings. Manufacturing Air, the air you breath \$135.00 filters, cleans, forces & controls the air in a 6 room home. We clean & repair all heating equipment.

A.R.HARRIS HEATING & VENTILATING #11

1931

machine, the production costs only Harris' time.

As stated, these messages are distributed by boys to the owner's door. The boys receive \$1.00 to \$1.25 per thousand. Mostly, the cards are distributed on Saturday, when the boys are out of school. Some of the youngsters have been distributing Harris' messages every Saturday for two or three years. As some of the messages show, every once in a while an appeal is made for distributors.

The cards are printed during the week. On Saturday, Harris loads his car with boys (six or more, usually) and drives them to the area to be covered that week. The boys each take a street and deliver a message to each home. If necessary, the boys are collected after working one side of a town and

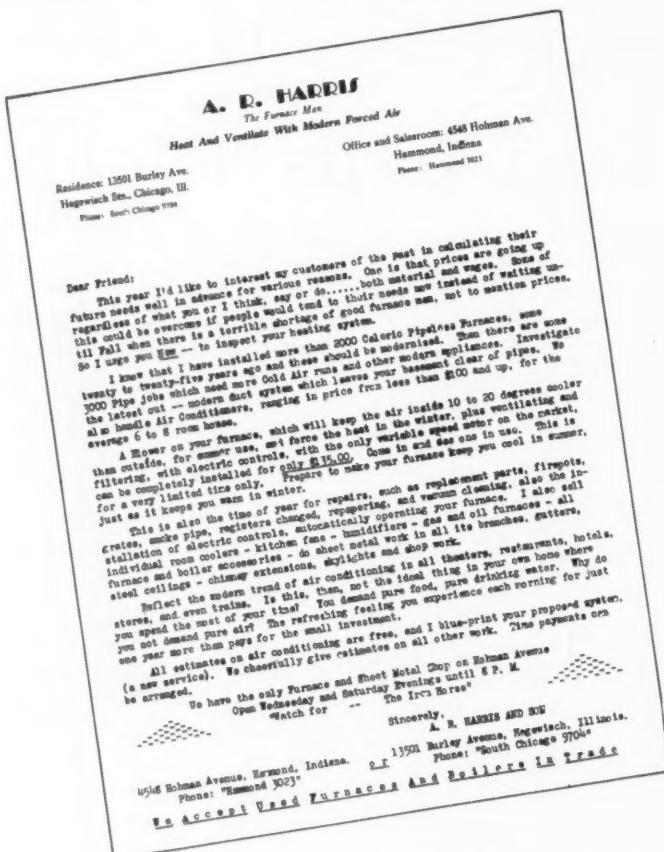
1934

taken to another part of the same town or a near-by town and started out again. Mr. Harris watches to see that only one card is left at each house and that every house is covered.

Mailing the cards was tried during a time when boys were hard to get, but personal delivery seems to have gained more attention and brought in better returns.

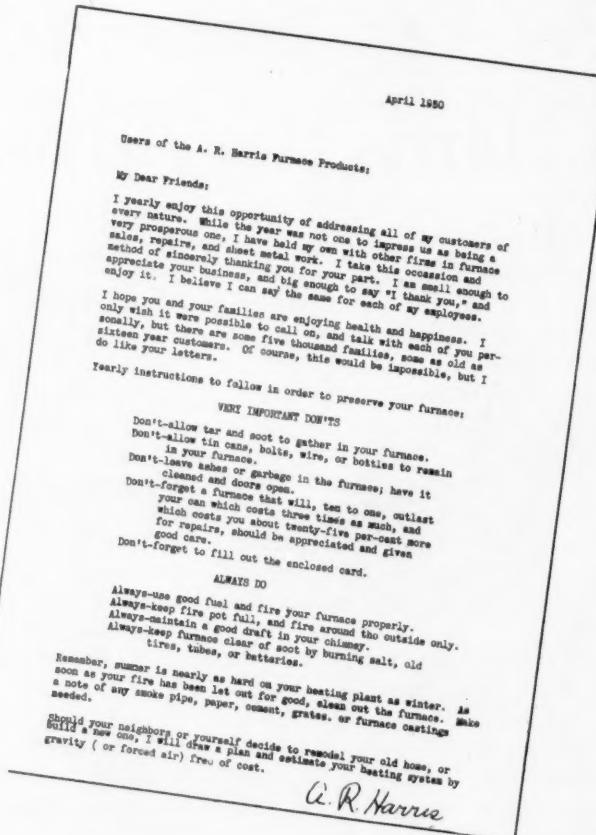
In addition to this card system, Harris uses canvassers to get furnace cleaning. During the cleaning seasons, at least two and sometimes more canvassers are put out. The cleaning service offered averages \$4.50 for the furnace, 50 cents for a first floor leader pipe, \$1.00 for a second floor leader pipe.

A few years ago, when radio was not so cluttered



1928

Two early letters, when forced air heating was just beginning. These were among the last of the letters; cards were substituted shortly thereafter.



1930

7-35 PRICES REDUCED

On all furnaces, repairs, and cleaning, for summer months only. So cheap, you can't afford to not have your furnace or boiler put into proper working condition. New and used furnaces \$20 and up. Repairs below regular price. Resetting and Reconditioning. See our air conditioning system in use, summer and winter. All furnace and boiler accessories trade in boilers and furnaces, Oil Burners, Stoves, etc. for sale. Call in at once, or visit our place of business and see this Air Conditioner for yourself, at present low prices. There is no more reason to perspire in summer, than to freeze in winter.

A. R. HARRIS FURNACE CO.
4548 Hohman Avenue Hammond 3025
Open Wed. and Sat. Eves.

1935

as it is today, Harris bought ten minutes twice a week at four o'clock in the afternoon and did his own talking. The messages he delivered over the air were quite similar in tone and content to the direct mail. This program was continued for two months until it developed that radio brought plenty of personal publicity, but not so many orders. Mr. Harris relates the story of leaving the studio one afternoon and on reaching the street being greeted by an acquaintance—"Why, I've just been standing here listening to you broadcast. You're quite an announcer." Which, Mr. Harris believes, emphasizes the personal publicity of radio, but does not make sales.

Newspaper advertising has been tried from time to time, but the space was costly, by comparison with the handbills, and for a small contractor not as gainful as the cards, in Mr. Harris' opinion.

Although Mr. Harris operates very modestly to-

Now is the time to inspect your furnace for cleaning - repairing - or remodeling. Install a modern filtered & Forced Air Circulation Unit on your present system at a low cost. Perhaps you would consider an Air Conditioning Unit which is completely filtered-humidified, and automatically controlled with Gas, oil, or stoker. We install the new Stokerless, Stoker Furnace, which has no moving parts. We can bring it to your door in a trailer for your inspection. See us in regard to Sheet Metal work - new and used furnaces - and automatic controls.

A. R. HARRIS & SON Open
WATCH FOR 4548 Hohman Avenue Wed & Sat
THE Hammond 3025 Eves.
IRON HORSE So. Chgo 9704

We are pioneers of residential Air conditioning. See samples and results in our office. Pays for its self in 5 yrs. In full savings, positive heating plus summer cooling comfort. The filtered Air we breathe is alone worth more to health of your family than the \$155 cost of installation. We repair, clean & remodel your old furnace. We carry a complete line of accessories, water coils, pipe, fire line, fireclay etc. Sheet metal work and job work. Buy and sell used boilers & furnace Open Wed. & Sat. Eve
WATCH FOR (office) A. R. Harris & Son
THE 4548 Hohman Ave. Hammond, Ind.
IRON HORSE Phone Ham. 3023 So. Chgo. 9704

1936

day, time was when he was one of the leaders in national sales of pipeless furnaces. By his own records, Harris, during the pipeless era, installed 8,000 pipeless furnaces in his area—which record is outstanding even in the records piled up by pipeless dealers.

These 8,000 owners of pipeless furnaces are Harris' backlog of customers. To them his present advertising messages are consistently directed. Harris believes that these owners know him, know his work, and have been satisfied. Today the plan is to tell these 8,000 pipeless owners about the advantages and benefits of modern winter air conditioning.

Demonstrating one value of the cards, it is not too unusual today to have cards, five and even ten years old brought in by a home owner with the remark—"I laid this aside thinking I might sometime need your service."

In 1939 at least one-third of all work—no matter what kind—coming into the Harris shop was directly traceable to the cards.

To my many friends and neighbors of Hegewisch and Burnham. I wish to thank you for work you have given me in the past 25 years and hope I have merited your confidence as I know there are many, many of the Caloric Furnaces of 20 to 25 yrs. ago doing service and have never had repairs. We repair and service all makes of heating, will remodel or air condition your house at about \$155.00 complete. Automatic controls \$16.00 to \$65.00 installed vacuum clean your boiler or furnace and save fuel. Ask for spring prices of cleaning and repairing. Estimate of remodeling or air-conditioning unit, - Free- Cools in summer, heats in winter, filters the air the year around.

A. R. HARRIS
"THE FURNACE MAN"

1939

1934

HOT! HOT! HOTTER!

Why not install in your furnace, that blower Fan you've thought so much about. In that simple way you can keep the entire house cool just as you formerly did just one room. Day or night. Automatic Controls pay for themselves.

Prices range from \$16.50 to \$65.00- Filters are \$1.25 & up - Furnaces \$46.50 & up- Steel or Cast. We carry a full line of Pipe-Paper- Brushes- Water Coils- Grates- Firepots for any make of Furnace. We do Sheet Metal work-Steel Ceilings-Gutter and Job work of a 11 kinds.

A. R. HARRIS
4548 Hohman Avenue
Hammond- 3025

Is the rain off your roof just ruining your lawn, flower beds, steps and perhaps the building itself?

Let us install some good gutter and save you money for years to come.

Why not check your furnace now? It may need any of the following items: A New Cast or Steel furnace, Air Conditioning, Booster Fan or Controls. Vacuum Cleaning, Reset and recenter your present furnace, Duct Work- An estimate on repairs or advice as to how you can make your home more comfortable for less money is cheerfully given

We finance your work upon request

Open	A. R. HARRIS	WATCH FOR
Wed. & Sat.	4548 Hohman Ave.,	THE
Eve.	Hammond 3025	IRON HORSE

In center—W. L. Rybolt presents association certificate of service to retiring president L. R. Taylor.



Above—Codes Committee takes a recess. From left to right—G. A. Voorhees, Earle Maynard, W. Redrup, E. B. Langenberg, Prof. L. S. Miller, W. D. Somers, Fred Bishop, B. F. McLouth.



Left, Cleveland Program Committee. Standing, left to right—Atlee Wise, R. A. Jack, G. G. Auer, C. E. Wilcox, A. G. Seymour, B. G. Krause. Seated, left to right—Frank Snowberg, A. L. Rybolt, A. W. Lehman, S. D. Yardley, H. S. Sharp. Absent—W. L. Seelbach, E. C. Fox, C. A. Olson.

N.W.A.H.&A.C.Ass'n Will Take Research to Public

CLIMAXING a year which, by all available records, has been the largest in sales volume in the past decade, the 44th convention of the National Warm Air Heating & Air Conditioning Association, held in Cleveland, January 22, 23, 24 and 25, had the largest registered attendance, witnessed some of the liveliest meeting sessions, viewed the largest heating and air conditioning expositon yet held, and launched new efforts for 1940 which probably will mark a turning point in association affairs.

Radio and Newspaper Publicity

Of most interest to contractors are the efforts of committees entrusted last year with the task of bringing all past research and co-operative effort into practical form which can be understood and appreciated by the customers who buy our product. This radical change in the association's outlook was exemplified by the sessions devoted to merchandising and publicity. The situation was brought to a head during the presentation of results obtained by

the association's publicity program presented by H. M. Hitchcock of the public relations council, Ames & Norr. Mr. Hitchcock said, in effect, that the industry has been conducting a publicity program consisting of news releases mailed to 106 newspapers and spot radio programs supplied to 127 radio stations. This publicity program, under way for the past year, has become established as an acceptable source of news by building page editors, radio commentators, and magazines serving the home owners. Up-to-date the program is approximately two-thirds completed and, declared Mr. Hitchcock, it will be too bad if this publicity effort is now abandoned. The speaker declared that the industry must decide whether to proceed with the program or whether to abandon the efforts entirely, due to a lack of popular subscription.

To Merchandise Research to Public

Chairman F. E. Mehrings of the Merchandising Committee, declared that the Committee had not

Officers and Directors for 1940

President—C. A. Olson; **1st V. P.**—H. S. Sharp; **2nd V. P.**—Shirley Percival; **Managing Director**—Allen W. Williams; **Directors**—C. Ackerson, B. M. Allen, R. W. Blanchard, Perl S. Miller, H. P. Mueller, C. W. Nessell; M. D. Rose, F. G. Sedgwick, L. R. Taylor.



Left, Mayor Burton welcomes a great industry to a great industrial city. Right, President for 1940-1941 C. A. Olson, declares that research and publicity shall be the twin aims and purposes during his tenure of office.



been able to arrive at any definite decisions on matters of policy and that, therefore, the session would be held as a clinic inviting all members and guests to participate in the discussion. Jan S. Irvine, as the first participant in the discussion, declared that popular subscription has proved to be a poor method for collecting the necessary money to conduct the publicity campaign and that, therefore, a very definite tax per unit produced should be applied against all manufacturer members. Mr. Irvine also declared that some method should be set up whereby jobbers and contractors could also participate in subscription.

Mr. Hitchcock, again called to the floor, stated that to carry on the program would require a definite amount of money and that this sum should be in hand before the campaign started. Contractor Dan Schmidlin of Toledo, Ohio, from the audience, declared that in his estimation some of the methods followed in the publicity program were not too good as, for instance, the amount of time spent contacting some newspaper building page editors when the same amount of time might better be spent out in the field or helping the contractor to sell.

Contractor E. Ludwig of Ottawa, Illinois, declaring that he was only a small contractor with not too much money for traveling and had found out about the publicity program only from the trade papers. And, since he was not a member of the organization, he had never been advised as to the idea behind the program. He declared that there must be thousands of similar small contractors all

over the country—each having some influence in his own particular community, but never having been invited to joint the association and not knowing how to join, and, furthermore, never having been told just what they would get for their money in case they did join the association—who would like to participate in some program which would directly benefit the small contractor through publicity to the contractors' customers and prospects.

Manufacturer Rudy Menk, Joliet, declared that the association must invite and encourage dealer memberships and should give member contractors a seal to show compliance with good installation.

Jan Irvine of the Committee and Mr. Mehrings, Chairman, stated that in their opinion these speakers had focused attention upon a long-time need of the association, namely, that some effort and means must be found to attract to the association the small individual contractor. The Committee, therefore, will, during 1940, devise ways and means whereby the contractor can participate in all of the activities of the association.

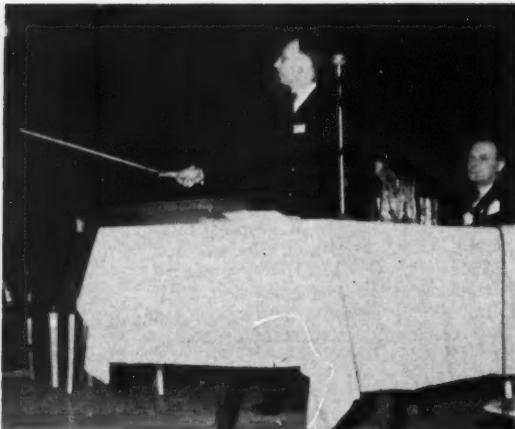
Research Staff House Plan Booklet

Much along the same line S. Konzo of the University of Illinois, declared that the Research Staff has become alarmed at the lack of use made of the Research findings. Seemingly, declared Mr. Konzo, most of the findings have not been used to their ultimate possibilities. Mr. Konzo said he had pro-



Left, Bennet Chapple telling audience our industry needs missionary enthusiasm while Jan Irvine, Frank Mehrings (behind speaker) and Harold Mueller take part in merchandising session. Right—H. M. Hitchcock likens publicity campaign to a bridge across a wide river with our industry on one side and public on the other.





Left—Chairman Sedgewick reports for Research Advisory Committee. Center—Prof. A. P. Kratz summarizes effects of insulation. Right—J. H. Van Alsburg explains effect of register size, shape and design on air flow.

posed to the Research Advisory Committee that the research residence staff prepare a consumer booklet. This booklet will present three grades of warm air heating and residential air conditioning systems in a series of 30 to 50 diagrams showing Class A, Class B and Class C systems. The diagrams, and explanatory text will endeavor to acquaint the home owner with the various items which must be found in a Class A or a Class B or a Class C heating system. The home owner can use such a booklet to classify the proposed plan submitted by the contractor and can thereby judge whether the contractor is offering a good, an indifferent or an outright poor system. All of the necessary elements, such as the furnace, its proper size; the duct system, with leaders; stacks, registers, shown by sizes; the control system; the location of registers and grilles, etc., will be shown in simple line diagrams for Class A, Class B and Class C systems.

Summarizing the discussion on public relations and publicity, Clarence A. Olsen, newly elected president of the association, in his first formal speech as president, stated as a policy for his term of office that the two activities—Research and Public Education—should and would form the principal activities of the association. Also, that in spite of the many years of research, such basic problems as two-speed fan operation, humidification, air cleaning, effect of insulation, still offer large fields for research. To these problems in research, declared Mr. Olsen, has now been added the problem of making available to the public in understandable form, the

research facts which the association has painstakingly developed.

President Taylor, terminating his two years as president, paid tribute to the untiring efforts of committees and individuals with special assignments. He emphasized how beneficial research activity has been; what progress has been made in the development and perfection of codes covering all types of warm air heating installation; declared that these codes would shortly become the basis for city and local area ordinances covering the design and installation of warm air heating equipment; the net result of these activities being, in Mr. Taylor's opinion, that competitive industry has been forced to adopt hasty measures and now plans to do research in its own forms of heating.

Bennett Chapple of American Rolling Mill Company, said during the discussion on publicity that \$25,000, which had been suggested as a suitable sum for the program visualized, was only a start and that he personally knew of another industry with not nearly so many members and not nearly so wealthy which was definitely planning to collect and spend in 1940 \$400,000 in advertising and publicity.

According to Mr. Chapple, the warm air, air conditioning industry holds the key to home comfort, convenience and home ownership satisfaction. People will spend money for less necessary accessories. It is therefore up to the warm air heating industry to convince the prospect that a good air condition-



Left—B. F. McLouth reports sales of codes increasing and changes in stack metal gauges. Right—Prof. Konzo answering questions on combustion with stokers and reports some types of "perforated" registers set up more resistance in one register than many contractors design for in a complete system.





Left—C. M. White said "business men should work together to make government a servant, not a social and economic arbitrator." Center—H. P. Mueller leads the discussion of future publicity and advertising. Right—Cy Burg produced three bogeymen of business and recommended Work for Inertia, Enthusiasm for Pessimism, "Do It Now" for Delay.

ing system is more essential to comfort and convenience than any other single accessory which the prospect may buy. What the industry needs, declared Mr. Chapple, is more real enthusiasm, the enthusiasm to pioneer, the enthusiasm to do missionary work whenever and wherever the opportunity presents itself.

Technical Discussions

A number of very important and interesting papers were presented during the various technical sessions. F. G. Sedgwick, chairman of the research advisory committee, reported that the committee is still looking for research ideas. Anyone having ideas which definitely will contribute to the progress and advancement of this industry are invited to submit their ideas to the committee. The Research Residence is now completely insulated and all tests covering design or equipment which are affected by insulation may be re-run during the coming year.

Prof. A. P. Kratz, speaking on "Heat Insulation," pointed out that a building is merely a barrier between the human body and the elements and that anything which is done to make this barrier more resistant to the passage of heat is definitely bene-

ficial. Prof. Kratz showed charts covering various types and thicknesses of insulation and the resultant coefficient of heat transmission through the entire wall. He also presented a chart showing the number of reflective insulation surfaces required to provide comparative degrees of insulation. This chart has been published a number of times in *AMERICAN ARTISAN*.

According to tests at the Research Residence, two inches of fill-type insulation is the minimum which should be used in a ceiling or in a side wall. Thicknesses of more than two inches show decreasing financial returns and, according to Prof. Kratz, there probably is some thickness limitation beyond which savings in fuel or the gain in human comfort is not economically feasible. Prof. Kratz also discussed the manner of calculating heat losses through insulated and uninsulated ceilings directly beneath an attic and explained why the calculation of the

(Continued on page 88)



President Taylor and President McIntire (ASHVE) "pull" duplicate gavels from hip pockets and exchange tokens of official recognition. Right — Prof. L. G. Miller announces the 1940 short course will be held March 18 to 21 as three courses.



National Sheet Metal, Roofing, Heating and Air Conditioning Contractors Ass'n Convention

IN Cleveland, on January 25, the long-planned and much discussed association of roofing, heating and air conditioning contractors was organized as a national association to be known as the National Sheet Metal, Roofing, Heating and Air Conditioning Contractors' Association. A complete board of officers and directors was duly elected and the regulations and by-laws published in the December issue of AMERICAN ARTISAN were discussed, corrected, approved and unanimously adopted. The association, which has been in process of formation for the past four years, therefore becomes an actuality.

Officers and directors elected, with the exception of the executive secretary, are all active operators

tractors in areas where a state association maintains a complete membership in the new National association. Or contractors in cities where a local association maintains complete membership in this National association.

Where the contractor is a member of a state association, the dues for each member will be \$2.00 per year. Where there is no state association, an individual membership will be \$5 per year.

Contractors interested in this new national organization can study the complete regulations and by-laws in the December issue of AMERICAN ARTISAN. The published regulations and by-laws were adopted with only minor revisions in most of the sections.

Officers for 1940

President—to be announced later.
Vice-President—Clarence J. Meyer, Buffalo, New York.
Treasurer—Carl M. Gundlach, Sandusky, Ohio.
Executive Secretary—Henry C. Bitter, Toledo, Ohio.

Board of Directors

William Feiten, Cleveland, Ohio. (1 yr.)
M. L. Van Lannen, Green Bay, Wisconsin. (3 yr.)
Aubrey L. Sykes, Chicago, Illinois. (1 yr.)
Carl M. Gundlach, Sandusky, Ohio. (1 yr.)
Clarence J. Meyer, Buffalo, New York. (3 yr.)
B. P. Stevens, Rochester, New York. (2 yr.)
Wm. W. Busch, Detroit, Michigan. (3 yr.)
R. F. Gehrke, Shawano, Wisconsin. (2 yr.)
K. L. Bonebright, Lincoln, Nebraska. (2 yr.)

of roofing, sheet metal, air conditioning or warm air heating establishments. The executive secretary, Henry C. Bitter, association address New Secor Hotel, Toledo, Ohio, having office facilities from which the affairs of the Toledo association are conducted and being thoroughly acquainted with the aims and accomplishments of the new organization was selected because he is situated to immediately assume the duties of secretary.

The hope was expressed by all the newly elected officers and directors—"that contractors from the various trades covered, realizing that this association has finally become an actual organization and is no longer 'something just talked about,' will take the initiative and assume membership as soon as possible."

Under the corrected by-laws, all individual contractors are eligible for membership, excepting con-

No attempt was made to make the first convention more than an organization meeting. The by-laws were discussed in detail by all of those present, necessary committees were appointed to study changes in the various sections of the by-laws. The complex problems of individual and association membership dues, the aims and purposes of the organization, required practically the entire day since some of the contractors had not attended previous meetings and were not acquainted with the objectives of the new organization.

As set up in the by-laws, the convention in assembly elected a Board of Directors, and the Directors in turn elected the necessary officers. This procedure was followed at the first meeting; the directors being elected to represent those states and dis-

(Continued on page 86)



Newly elected officers and directors. Left to right—Director J. E. Peterson, Hinsdale; Director W. W. Johns, Urbana; Vice-President C. H. Lauerman, Galesburg; President J. J. Walter, Ottawa; Treasurer F. I. Eynatten, Peoria; Secretary J. E. McMackin, Salem; Director Louis Drehobl, Chicago.

Illinois Convention Reports Progress of State Licensing Bill

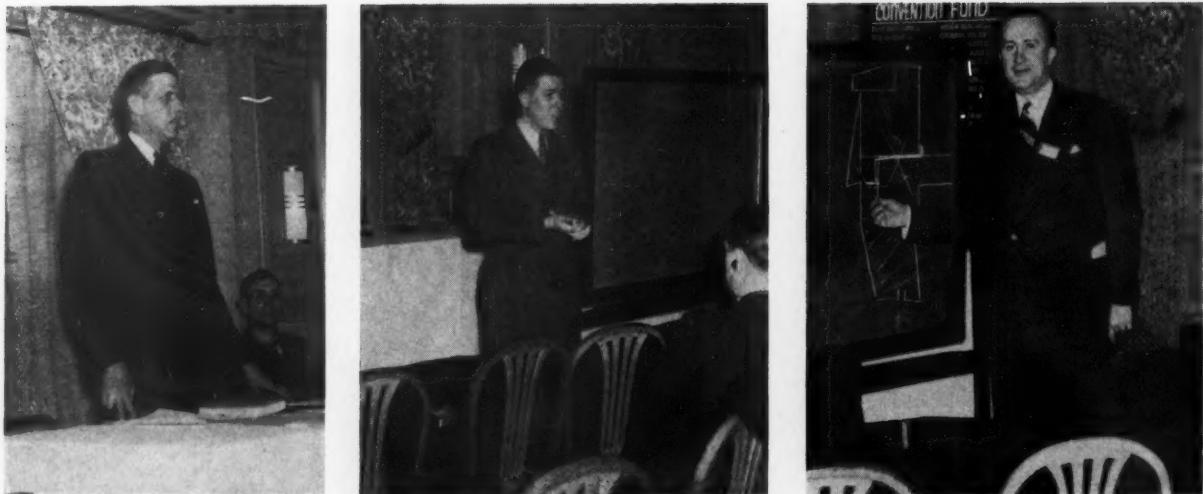
TECHNICAL papers of a high caliber and business discussions of practical value highlighted the 1940 convention of the Sheet Metal Contractors Association of Illinois, held January 17 and 18, in Peoria. All of the officers serving for 1939, with the exception of Secretary J. E. Peterson, Hinsdale, who was appointed to serve temporarily, were re-elected. J. E. McMackin of Salem, Illinois, was elected secretary for 1940. Directors serving for 1939 were reelected for 1940.

The most important business discussion centered around the proposed Illinois bill to license warm air heating contractors. Led by President Walters and chairman of the license law committee, J. E. Peterson, the proposed bill which is now in printed

form was read to give attending members an opportunity to study and discuss the bill in detail. This proposed licensing ordinance is to cover all of the State of Illinois; all contractors engaged in installation, repair or replacement of warm air heating plants of any type are to be licensed; a board consisting of five members, four of whom are to be contractors with at least ten years' business experience in the field is established. This board is to conduct examinations for licenses and is also empowered to establish the rules and regulations under which gravity and mechanical warm air heating systems are to be installed. Due to the fact that the Illinois legislature will not meet in ordinary assembly until 1941, it was decided to publish

At left—President J. J. Walter opens the convention and reports that the Illinois State Licensing Law has made progress. Below—Officers and directors of the Salesmen's Auxiliary. Left to right—J. B. Sauer, R. B. Smelzer, H. H. Bartlett, E. L. Eichenberger, Etta Cohn, H. G. Sell, E. H. Olson.





Left—G. T. Gaskins explains what is a "fixture" and when and on what contractors should pay sales tax. Center—D. S. Dickey shows what is good combustion and tells how combustion can be judged. Right—Paul Davis telling contractors that modern buildings use more sheet metal than the old corniced job and where this metal goes.

the proposed legislation so that all Illinois contractors could study the bill and, if possible, to hold regional meetings during the first six months of 1940, at which meetings all contractors will be invited to discuss the bill and offer suggestions.

The bill automatically certifies all contractors who have been in business for the preceding one year, but new contractors must obtain a license by passing an examination. The original license fee is established as \$50 with \$5.00 annual renewal fees. The bill also sets up the means whereby cities can establish their own rules and regulations for the installation of warm air heating systems, providing such local ordinances meet the minimum specifications established by the state law. Local ordinances will be under the control of local inspectors and local boards but communities not having their own ordinances will come under the jurisdiction of the regulations and the inspectors of the state law. The discussion indicated that there are a number of the important points to be clarified and probably several

sections which must be reworded in order that the exact meaning will be defined.

Sales Tax Discussion

Also of a practical business nature was the address by G. T. Gaskins, Supervisor, Department of Finance, State of Illinois, who explained that many of the reversed decisions in connection with the Illinois "sales" tax have been due to reversals of opinion by different state courts. The department has only attempted to apply rulings in accordance with the various court decisions.

At the present time, the law is construed to mean that the contractor must pay a tax upon "fixtures" and "fixtures" are defined as those pieces of equipment which do not lose their identity after installation. A furnace is a fixture and the tax must be paid upon the cost price of the furnace; a register or a gutter is not a fixture because it loses its identity after installation and therefore no tax is paid upon registers or gutters.



Left to right—John Wallis called upon years of service work and told the audience just why automatic fired jobs develop trouble and how to remedy them. M. L. Lavorgna said contractors need more good service men. F. O. Jordan explained his school's training of mechanics and engineers. A. W. Ryba demonstrated his kit of testing and balancing tools and explained the steps he goes through to balance a job.



Left—J. E. Peterson, Chairman of the state licensing law committee, read the law through and lead the discussion from the audience. Progress has been made with the law and it will be ready when the next regular legislature meets in 1941. Below—Registration began early. By the close of the first day attendance had exceeded all previous conventions since the revival of the association.



The state department of finance has prepared a list of items commonly used in the warm air heating-sheet metal contracting industry, showing items which are considered fixtures and items which are not considered fixtures. This list can be obtained from the department of finance upon application. Under the ruling, the wholesaler pays to the State Department of Finance a tax on the fixtures and in turn bills the contractor. The discussion brought out the fact that many contractors have been paying taxes to wholesalers on items which are not considered fixtures.

Another interesting business discussion was conducted by W. F. Watten of the Hardware Mutual Casualty Company, who explained briefly some of the salient points of compensation insurance and a protective insurance for contractors.

F. O. Jordan, Technical Director, Industrial Training Institute, outlined briefly the courses of study offered by the Institute and explained some of the training which the Institute is offering to contractors, their apprentices, and individuals wishing to learn something about the warm air heating and air conditioning business.

New Uses for Sheet Metal

Among the interesting technical papers presented was a discussion of ways and means whereby the sheet metal contractor can increase the amount of sheet metal used in new style construction by P. G. Davis, District Manager, The Cheney Company. Mr. Davis pointed out that whereas much old time architectural metal work such as cornices has been lost to the sheet metal contractor, this amount of material is now more than made up by new applications of sheet metal such as extensive protection against moisture penetration by the proper use of flashing. Mr. Davis pointed out that whereas five or ten years ago a building having a roof perimeter of approximately 400 feet would call for approximately 175 feet or 175 pounds of flashing, today

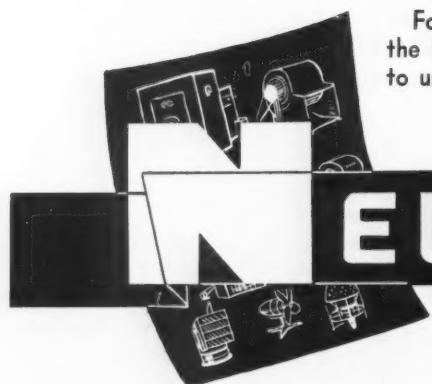
promotional work had increased this amount of metal many times and it is not unusual now to find a building of the same size having as much as 40,000 pounds of flashing. Today it is quite common practice, architecturally, to thoroughly flash copings, parapets, water tables, buttress caps, sills and lintels, in addition to a new development which uses sheet metal for the flashing of spandrel beam construction of either reinforced concrete slab or slab on steel beam construction.

Instruments to Check Combustion

D. S. Dickey set up the premise that customer satisfaction is due primarily to the satisfactory operation of the heating system and pointed out that with the rapid advance in automatic firing using stokers, oil burners, and gas fuel, where gas and oil are still considered an expensive fuel, the contractor should be certain that the customer is receiving the maximum possible efficiency from the fuel consumed. Mr. Dickey stated that it is impossible to determine combustion efficiency by simply looking at the fire, and that the use of instruments to determine the proper amount of draft, the proper amount of CO₂, are absolutely essential. He illustrated his discussion with lantern slides, showing good and bad combustion and the range in readings for stack temperatures, draft across the fire, and CO₂, which indicate poor and good combustion.

Much the same general idea of customer satisfaction was propounded by M. L. Lavorgna, sales engineer, L. J. Mueller Furnace Company, who emphasized the rapid acceptance of gas as a fuel and pointed out that in all automatically fired furnaces customer satisfaction is obtained largely by the promptness of service rendered by the contractor. The speaker also pointed out that too few contractors maintain a service department. Also, that contractors too often look upon the service

(Continued on page 94)



For your convenience a number has been assigned each item. Circle the items in which you are interested on the coupon on page 98 and mail to us.

● Indicates product not listed in 1940 Directory.

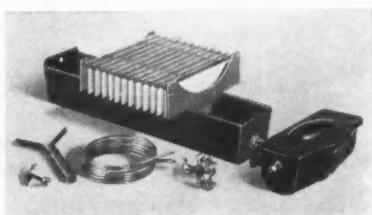
△ Indicates product and manufacturer not listed in 1940 Directory.

NEW PRODUCTS

1—New Viking Humidifier

Viking Air Conditioning Corporation, 9500 Richmond Avenue, S.E., Cleveland, announces a newly designed humidifier.

The new Series 1100 humidifier consists of two separate units, an evaporating pan and a float chamber



which contains the Viking Top-Seat flat valve assembly. The float tank is located outside the furnace where all working parts are readily accessible.

The evaporating pan, protected by two coats of acid resisting porcelain enamel, can be installed in warm air plenum chambers, ducts and small cabinet spaces. The 12 Pyroxene evaporator plates, which are suspended from a copper rack provide an evaporating surface of 480 square inches.

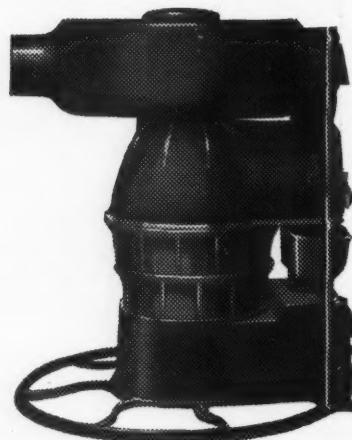
The Series 1100 Humidifier is supplied complete with all necessary fittings for installation.

▲2—Tannic-Acid Treatment

Davis Emergency Equipment Co., 55 Van Dam St., New York City, offers for first-aid burn treatment a preparation known as Tannoid, which consists of a water-soluble jelly containing the proper proportion of tannic acid. The preparation is spread on the burn from a collapsible tube and covered with a compress.

CORRECTION

In AMERICAN ARTISAN'S January, 1940, Directory and Show Issue, page 37, Century Engineering Corporation's advertisement shows its Zone-King and Zone-Queen furnaces with the captions transposed. The unit shown with the burner installed outside the jacket is the Zone-Queen, not the Zone-King as indicated, and the unit with the totally enclosed jacket is the Zone-King.



3—Economy Air Conditioner

International Heater Company, Utica, N. Y., is offering the No. 30-P Economy Blue Front furnace.

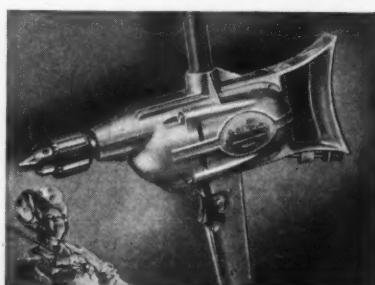
The new jacket construction allows the blower to be installed on either side or back.

Cooling coils may be installed and mechanical cooling had either with a compressor or by circulating cool water. Or, effective cooling may be had by the operation of the fan after removing the panel from the blower housing.

The No. 30-P Economy heats, filters, humidifies and circulates the air and is rated according to the code of the National Warm Air Heating and Air Conditioning Association. There are five sizes—82,850, 98,900, 116,600, 136,850 and 151,700 Btu capacity at the register, at 7½ lb. combustion rate.

4—Thor Drill Champion

Independent Pneumatic Tool Co., 600 West Jackson Blvd., Chicago, announces a new ½-inch light-duty port-



able electric drill known as the Thor Drill Champion, designed for intermittent service.

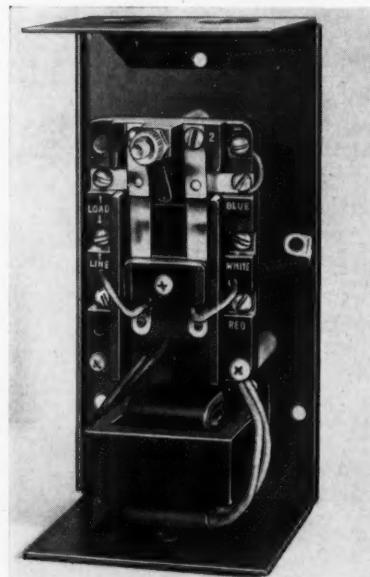
The ½-inch drill weighs 9¼ pounds

and is 15¼ inches overall. Standard equipment includes double pole momentary switch fully enclosed in a dust-proof compartment in switch handle, a spade handle and removable dead handle. A handy spring clip retainer for chuck key is provided. 3-jaw Jacobs chuck and 3-conductor cable and plug are furnished.

Descriptive circular P-27 is available.

5—Universal Transformer Relay

Gleason-Avery, Inc., Auburn, N. Y., is introducing a new type transformer relay—the Universal—to operate with any low voltage thermostat, two and



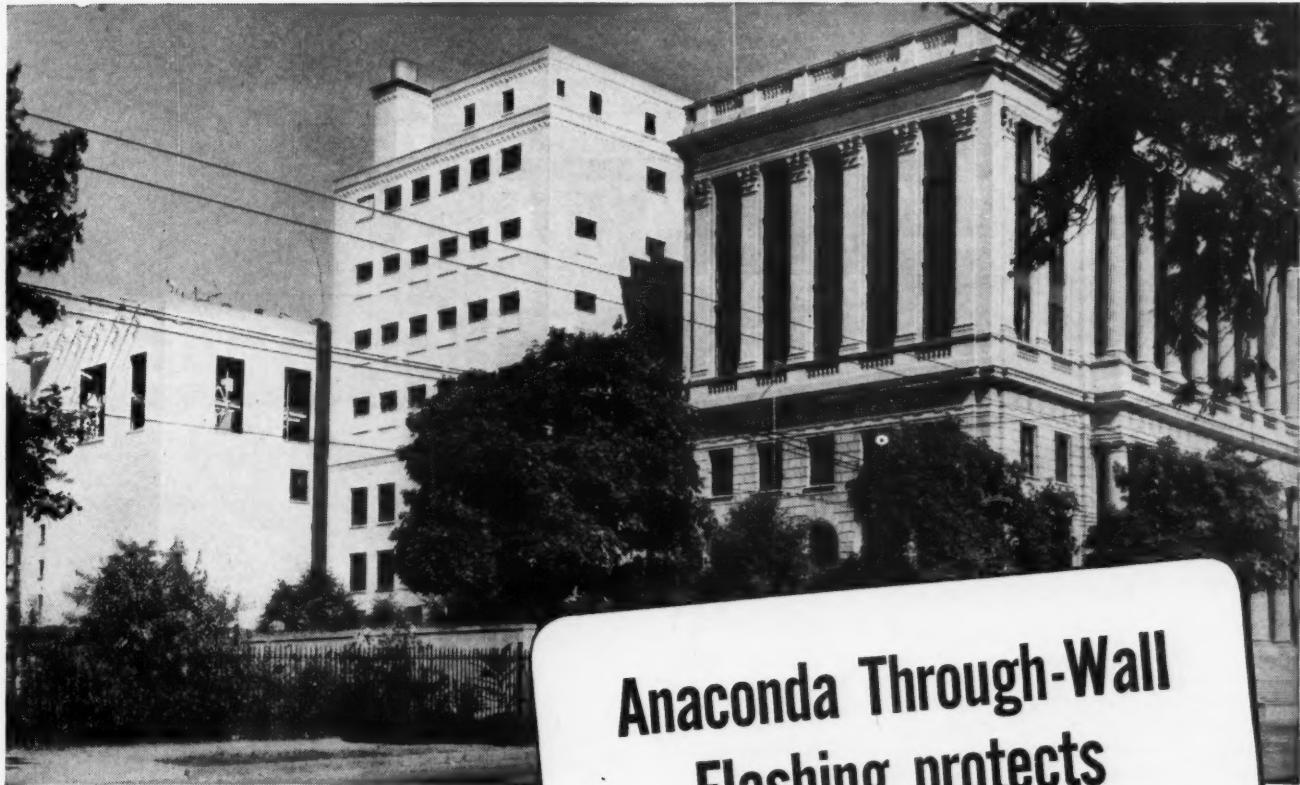
three wire, in black Japan finish. Control circuit: 25 volt, 3 wire. Motor rating: Single phase, ½ h. p. Electrical rating: 110 volt, 60 cycle A. C.

Catalog sheet with wiring diagrams is available.

6—Galvanized Snow Guards

David Levow, 308 West 20th St., New York City, announces that they are now making the "Protector" snow guards in galvanized iron due to a demand from the trade. Special screw nails are furnished.

The company carries hot galvanized wood screws in stock and furnishes these free of charge with "Fitrite" snow guards.

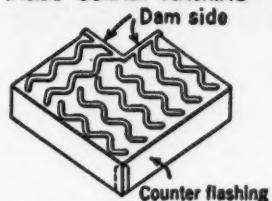


Newest addition (extreme left) to the Mutual Benefit Life Insurance Co. Building in Newark, N. J.
Architects: John H. and Wilson C. Ely, Newark.
General Contractors: Starrett Bros. & Eken, Inc., New York.
Sheet Metal Contractors: Chrystie Cornice & Skylight Works, New York.

Anaconda Through-Wall Flashing protects another modern building

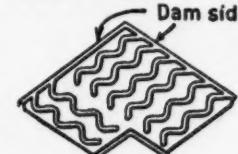


INSIDE CORNER FLASHING



Standard inside corner flashing unit. Dam on inside; drains out.

OUTSIDE CORNER FLASHING



Standard outside corner flashing unit. Dam on outside; drains in.

ANACONDA
from mine to consumer

Left:
These special one-piece corner flashings for 8° and 10° walls supplement a complete line of straight flashings which are available in 5' and 8' lengths, in standard and special widths with various selvages.

This copper flashing is easy to install, efficient and positive, yet relatively inexpensive

Anaconda Through-Wall Flashing, made of 16-oz. copper, is stocked by leading sheet metal supply houses. The following clean-cut advantages explain its fast-growing popularity:

1. The 7/32" high zigzag corrugations provide positive bond with the mortar in all lateral directions.
2. The integral dam throughout the length gives complete drainage in the desired direction. *This flashing will drain itself dry on a level bed.*
3. The flat selvage permits neat, sharp bends for counter-flashing or locking to adjacent sheet metal without distorting the flashing or interfering with free drainage.
4. Anaconda Through-Wall Flashing is easily locked end-wise, even with edges bent, merely by nesting one or two corrugations. Such joints are water-tight because of the raised corrugations.

3089

Anaconda Copper

THE AMERICAN BRASS COMPANY, General Offices: Waterbury, Conn.
In Canada: Anaconda American Brass Ltd., New Toronto, Ont. • Subsidiary of Anaconda Copper Mining Company

ASSOCIATION ACTIVITIES

Pittsburgh Father and Son Meeting

Sheet Metal and Roofing Contractors' Association of Pittsburgh held the first meeting of the new year on January 10 with a buffet dinner in the Dutch Room of the Fort Pitt Hotel. After dinner the members, their sons and guests retired to the Assembly Room for entertainment and the meeting.

Moving pictures of crimes committed in Pittsburgh and reenacted by the criminals themselves were shown through the courtesy of Pittsburgh Police Inspector Walter C. Monaghan and George F. P. Langfitt, first assistant District Attorney of Allegheny County.

This association weathered through the dull years and has secured legislation during 1939 that was beneficial to the members and buying public in general.

Among the most important issues in 1939 was the securing of lower rates for workmen's compensation. Prior to July 1st the inside rate was \$2.50 and the outside rate \$4.05. After the reduction the inside rate is \$1.85 and the outside rate \$3.05 on sheet metal work, the outside premium (minimum) was reduced from \$70.00 to \$43.00. These reductions were gained through the hard work of the local association and the assistance given by the officers and members of the Pennsylvania State Association.

1940 officers are:

President, Jos. C. Meyer
Secretary, E. W. Scarborough
Treasurer, W. J. Fortenbacher

Board of Directors:

Ashley E. Dreyer	Walter Shultise
W. J. Keist	Leonard Harrison
Herbert Helt	T. C. Timmerman
W. H. Scholes	
E. W. Scarborough, Secretary.	

Cleveland

To the Trade:

"The Warm Air Furnace & Air Conditioning League of Cleveland, Ohio, desire an expression as to the merits or demerits of all Heating Codes.

"We would appreciate a report from every heating man reading this letter, if he is controlled by a code. The letters need not bear the name of the firm sending.

"Please address all correspondence to The Warm Air Furnace & Air Conditioning League, Inc., Irwine Lewis, Secretary, 11705 Miles Ave., Cleveland, Ohio."

Irvine Lewis, Secretary.

Milwaukee

The Milwaukee Master Sheet Metal, Heating, Ventilating and Air Conditioning Contractors Association held their annual meeting on December 4, 1939, at Alonzo Cudworth Post No. 23, 1756 N. Prospect Avenue, Milwaukee. The meeting was called to order by President Frank Kramer in the presence of 24 members.

Communications included an inquiry from C. Starkweather and Son of Beaver Dam regarding a second hand brake, and an invitation from the Furnace and Sheet Metal Institute of Chicago to attend their annual President and Ladies Night affair.

Legislative Committee Chairman Fetting announced that the State Committee had in charge the compiling of a licensing law similar to that of the locals. He advised that

the proposed law would receive consideration at the coming convention.

Publicity Chairman Schaar rehearsed the activities of his committee, relating the advertisement campaign in the Milwaukee Journal.

Membership Chairman Holming recommended the acceptance of the M. Priegel application, seconded by Schaar, and the new member was unanimously approved. The high initiation fee with dues in connection with the present membership was discussed.

The annual report of the secretary was read and placed on file.

The change of name was discussed freely and lengthily. A motion was made, seconded and accepted. The secretary was requested to submit a sample letterhead with listings as suggested at the meeting. Some felt that the various types of work should be listed on our letterheads.

Work confiscated by other crafts—such as stokers, oil burner and other equipment—was discussed and suggestions offered.

Attention was called to the unethical slams of the heating and piping contractors, but opinion prevailed that the association await another publicity issue and call their attention thereto if there was a repetition.

The Chair appointed Schall (Chairman), Geire, Bauer and Walters nominating committee; who presented names for election to the Board of Directors. Voting proceeded with the result that the following were elected:

Joseph Bauer	Harry Eschenburg
Angelo Hoffmann	Frank Kramer
A. C. Mantei	Walter Marth
Martin Schaar	Robert Schomann
Al. Walters	Paul L. Biersach, Executive Secretary

The board being complete, it was decided to call an early meeting for the election of officers and organization.

PAUL L. BIERSACH, Secretary.

Milwaukee

At the first meeting of the newly elected Board of Directors of the Milwaukee Sheet Metal Contractors Association, Inc., the following officers were elected for the year 1940:

President, Angelo Hoffmann
Vice President, Martin Schaar
Secretary, Harry Eschenburg
Treasurer, Walter Marth
Executive Secretary, Paul L. Biersach
Sergeant at Arms, Fred Wicke

The furnace group have extra meetings for educational purposes, teaching the members to estimate correctly. The meetings are held on the third Monday of each month at the Hotel Medford, N. Third and W. Michigan Sts.

PAUL L. BIERSACH, Secretary.

Akron

A. W. Howe, President, and C. A. Nenno, executive vice-president, J. M. & L. A. Osborn Co., Cleveland, were guests of honor at the recent annual dinner of the Akron Sheet Metal Contractors Association.

Mr. Howe spoke on the need for a real contractors' organization and Mr. Nenno screened movies of his recent European and African trip.

News Items

Forced Warm Air Short Course

The Technical Education and Short Course Committee met at 9 a. m. Monday, January 22, with B. F. McLouth, Dail Steel Products Co.; Ed. Root, Superior Safety Furnace Pipe Co.; J. E. Maynard, Fox Division of American Radiator and Standard Sanitary Corporation; Gilbert Denges, Williamson Heater Co.; Fred Bishop, The Brundage Co.; Frank Meyer, Meyer Furnace Co.; and Professor Lorin G. Miller, Michigan State College, Chairman, in attendance.

Approval of the dates of March 18, 19, 20 and 21 for the 1940 Conference and discussion of the methods of conducting the course formed material for discussion.

Ross Wallis of Meyer Furnace Co. will be in charge of the beginners' section in which the design of a forced warm air heating system for a small Colonial residence will be completed.

Gilbert Denges of Williamson Heater Co. will direct the design of a zoned forced warm air system for a large residence. The residence is built near to East Lansing to permit inspection by the group.

For the men interested in cooling design, a problem of cooling a small theater will be available under the guidance of Walter Schlichting of Clarge Fan Co., Kalamazoo, Mich.

Professor A. P. Kratz will be at the conference and deliver a lecture on combustion in addition to being available for conferences.

Some of the outstanding speakers on the general program are:

C. W. Nessell of Minneapolis-Honeywell Regulator Co.
Wm. Cook of Green Foundry and Furnace Works.

Guy Voorhees of Furblo Co.

Stuart Sommers of Lamneck Products, Inc.

"Make it practical" is the keynote of the plans for the

meeting. Laboratory demonstrations, data from experiments, experience of investigators and discussions in small groups will insure the accomplishment of a most practical session.

H. W. Glassen, a Lansing attorney, will deliver the banquet address on the law as it applies to air conditioning, to labor, and to business policy.

The cost will be nominal and the accommodations ample. Prof. L. G. Miller is director.

Obituary

John C. Kreidt, Fort Wayne, Indiana, died on November 29. Retired from active sheet metal work, in which he was engaged for many years, he still maintained his interest in whatever had to do with the sheet metal industry.

Charles Johnson, Sr., Peoria, Illinois, interested in the sheet metal industry all his life, but inactive for some years, died and was buried January 17.

Coming Conventions

1940

Feb. 12-14—Master Sheet Metal, Heating, Ventilating and Air Conditioning Contractors Association, Inc., Hotel Pfister, Milwaukee. Exhibits. Paul L. Biersach, Secretary, 225 E. Michigan St., Milwaukee.

Feb. 13-15—Ohio Sheet Metal Contractors Association, 26th Annual, Hotel Commodore Perry, Toledo. Henry C. Bitter, Secy., 218 Hotel Secor, Toledo.

Mar. 18-21—Forced Warm Air Conference, Ninth Annual Short Course, Michigan State College, East Lansing, Michigan. Professor L. G. Miller, Director.

Mar. 26-27—New York State Sheet Metal, Rfg. & Air Conditioning Contr. Assn., Inc. Annual with Exhibits. Hotel Martin, Utica, N. Y. Clarence J. Meyer, Secy., 569 Genesee St., Buffalo.



POPULARLY PRICED DAMPER REGULATOR SET

NOW OFFERED WITH
SNAP END BEARING
.... At 32c (List Price)

The No. 40 $\frac{1}{4}$ S Set shown at the right is identical with our popular No. 40 $\frac{1}{4}$ Damper Regulator Set except that No. 40 $\frac{1}{4}$ S is furnished with H & C Snap End Bearing which permits installation of even the smallest dampers without bending. However, No. 40 $\frac{1}{4}$ S Set does not displace the No. 40 $\frac{1}{4}$ Set which has a solid end bearing. List Price of No. 40 $\frac{1}{4}$ S Set is 32c; List Price of No. 40 $\frac{1}{4}$ Set is 30c.



No. 40 $\frac{1}{4}$ S Complete Set (1/4" Bearings)

Both are quality-built, economical sets assuring quick and secure installations. Both are furnished with a wing and a hexagonal nut for installation in any one of three ways. Equally adaptable to round or square ducts, splitter or regular dampers. All parts are rust-proofed. For economical, quality-built damper regulator sets, ask your Jobber about No. 40 $\frac{1}{4}$ and No. 40 $\frac{1}{4}$ S Sets.

HART & COOLEY MANUFACTURING CO., Holland, Mich.—Chicago, 61 W. Kinzie St.

Five-Zone Stoker-Fired System

(Continued from page 49)

of the blower is drawn in from the ravine for cooling. Tests show that a 10-degree reduction in air temperature can be thus obtained.

For winter operation a duct thermostat—inside the outside air duct—closes the damper to its minimum setting whenever the outside air temperature drops to 35 degrees. At this "closed" damper setting approximately 15 per cent outside air is taken into the system for ventilation.

Construction Details

The house is unusually constructed. The exterior is 8-inch stone walls, then a 2-inch air space, then 8 inches of brick in which furring strips are chased. Between these furring strips there is a bat of insulation. Partitions are steel studs with open spaces filled with 6 inches of insulation for sound deadening. The floors are poured concrete on steel pans.

As can be realized, this construction necessitated laying out all openings long before the heating system was installed. Franck and Fric make a practice of detailing such installations in $\frac{3}{4}$ -inch scale to make sure that all openings by others are exactly as planned and of full opening size. On this job openings were located and chases for stacks marked off and when the time came to place pipe work there was not one change required. All this detail-

ing and the engineering for Franck and Fric is under the supervision of Bob Cummings.

Since this house is several miles from the office, a shop with complete equipment was set up in the basement of the house. Sheets were delivered flat and were cut, formed and fabricated in the house. It developed that this plan saved considerable time and cost because numerous major changes were made in inside plans and arrangements while the house was being built.

The lightest metal used was 24-gauge and heavier gauges were specified according to the ASH&VE table of weights and widths. Standing seam slip cleats or galvanized iron angles were used to stiffen sections and these were formed and cut on the job.

Duct Hangers

One of the details shows the duct hangers peculiar to this installation. When the concrete floor slabs were poured, the horizontal hanger rods shown were placed in the concrete. From these rods the hanger rod shown was suspended with two asbestos insulation washers used to keep metal from metal. This detail is to keep vibration noise from being transmitted to the house or from the house to the duct.

In addition, for a distance of 6 feet out from the plenum, the warm air and return pipes are insulated with $\frac{1}{2}$ -inch of acoustical felt applied on the inside. The plenum is similarly insulated. Small galvanized iron washers and metal screws were used to screw the felt to the metal. All supply pipes from furnace to register are wrapped in $\frac{3}{4}$ -inch air cell for



new modern design ★
Easy
Foot
Operation
with
Niagara Gap Shears

It is smart buying to choose a gap shear. 18 inch gap lets you cut sheets longer than cutting length of shear! New modern design provides easy foot operation and convenient handling of sheets. Rigid housings maintain alignment of working parts and accuracy of knife travel. Self-locking eccentrics make it possible to let go of the holdown while stepping on the treadle.

Complete with gages and genuine Niagara alloy steel knives.
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Please send copy of Bulletin 80-C.

Name
Concern
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NIAGARA



AIR FILTER PANELS FOR
AIR CONDITIONING AND
VENTILATING SYSTEMS

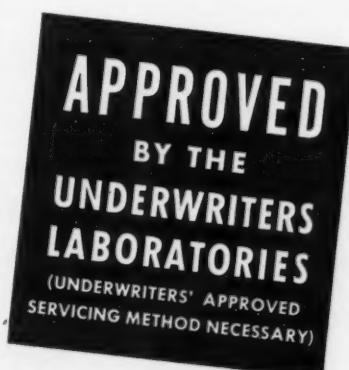
Take your choice - **CLEAN OR THROW AWAY**

● When you *throw away* the "conventional" air filter it must be replaced at a cost of a dollar or more. And this operation must be repeated three or four times a year. If you try to save by keeping the filter longer the efficiency of your system is seriously impaired. When you *clean* the AIR-MAZE Kleenflo air filter it costs only a few cents. And your filter then is like new with all of its original performance and characteristics restored.

You can figure the saving yourself when you consider that AIR-MAZE Kleenflo filter panels *need no replacement*. With ordinary care they will last as long as the air conditioning system in which they are used. During all these years they continue to give top-notch efficiency and dependable trouble-free performance. *That's real economy!*

Of scientific all-metal construction, Kleenflo air filter panels are *approved by the Underwriters Laboratories* as fire retardant. They are odorless, sturdy and easy to handle as they slip readily into existing panel spaces.

Write for information on how AIR-MAZE Kleenflo panels will solve your air filter problems.



AIR-MAZE CORPORATION
5130 HARVARD AVE., CLEVELAND, OHIO

AIR-MAZE

We beg your pardon...

... if you were one of the many who tried to push and squeeze through the crowd gathered in front of the Air Controls' exhibit at the Heating and Ventilating show last month. It is annoying to have one's progress hampered.

But, it's even more annoying...

... to us to know that you may have been prevented from seeing what it was that attracted so much attention. We humbly apologize for not having had more space in which to demonstrate:

the revolutionary PATROL MODULATOR, the long-famous REX BY-PASS LOUVERS, the REX AIRATE Home Cooling Package, and the twin blower which showed the superiority of REX center-hub BLOWER WHEELS!

We'll be glad to make amends...

... in case you didn't get to see our exhibit ... or weren't able to visit the exposition at all . . . by sending you literature which explains and illustrates why it will pay you to use or sell any, or all, of the above products. The coupon is your ticket—mail it today.



Division of

THE CLEVELAND HEATER COMPANY
1933 W. 114th St. Cleveland, Ohio

Please send me data on the PATROL MODULATOR . . . , REX AIR-PAKS with BY-PASS LOUVERS . . . , REX BLOWERS . . . , REX AIRATE

Name

Firm

Address

City

temperature insulation and all return pipes with $\frac{1}{2}$ -inch of insulation. This was applied on the outside of the duct and held in place with a complete canvas wrapping. The canvas was not painted. The edges of the insulation were joined with asbestos cement to obtain a smooth corner under the canvas.

Contract and Prices

As stated, the system was designed and engineered by Bob Cummings for Franck and Fric. The original layout was made by the engineering department of the furnace manufacturer, but so many changes were ordered by the owner that a completely new system eventuated.

The original bid was for \$13,600, with an additional \$5,300 for the copper sheet metal work on the exterior (decks, flashings, dormers) and inside metal work like range hoods, etc. Ten feet were cut off one end of the house, which reduced the selling price, but later changes ordered by the owner brought the price finally to \$14,500.

As to operation, recent cold weather (20 degrees below zero) showed all rooms within $1\frac{1}{2}$ degrees plus or minus at all times at a fuel consumption which indicates estimates will be reduced substantially. The owner reports that guests remark the uniform, even temperatures, refreshing atmosphere and the absence of absolutely all noise, even air noise at the registers.

New Sheet Metal, Roofing, A. C. Contractors Convention

(Continued from page 76)

tricts of the country best represented at the meeting; and at a later meeting these directors elected the officers and the executive secretary.

As expressed on the convention floor, there are many things which this new National association can do. It can promote and foster better business relationship between its individual and association members; it can promote friendly relations between members and contractors outside the organization, and between our industries and other trades; it can serve as a clearing house for information on labor and wage questions; it can express to jobbers or manufacturers certain solutions to problems now pressing; it can strive to elevate the material used and the practices followed by contractor members and can, by education, attempt to establish fair competitive conditions.

These, in brief, are the aims of the new association. The relationship of contractor members to local associations, to state associations, to the new national association, was deliberately established in order to make membership in local and state associations more attractive to individual contractors. This same relationship was also selected in order that there may be one centralized organization for the industries represented streamlined from contractors to a national body.

Air Control

DEALS YOU A PAIR THAT CAN'T BE BEAT!

- 1 The New Adjustable GRAVITY REGISTERS
- 2 Dual Control AIR CONDITIONING REGISTERS

ADJUSTABLE GRAVITY BASEBOARD REGISTER styled in the modern manner with adjustable fins for converting your gravity installation into a draftless installation by adding a blower and adjusting fins. Other superior features are Sponge Rubber Gasket for positive streak-proof installation. Improved spring tension valve mechanism—requires no adjustments. Fin type construction—giving maximum efficiency and low resistance, and a beautiful Metalectic finish at no extra cost. No. 30 sidewall registers are styled to harmonize with the AIR CONTROL Baseboard Register and embody the same outstanding features.

For more complete details, write at once for AIR CONTROL'S Bulletin 40G.

AIR CONTROL AIR CONDITIONING REGISTERS AND GRILLES have already become the standard solution for your air distribution problems. Completely adjustable for both vertical and horizontal air deflection. Non-streaking sponge rubber seal, positive valve mechanism, and adjustable fins. New low prices enable you to standardize on AIR CONTROL Registers and Grilles for all installations.

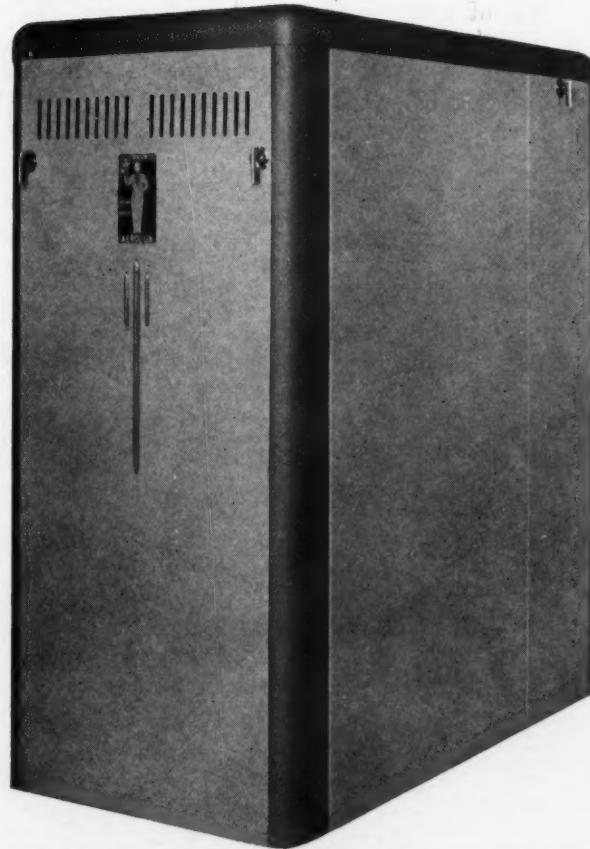
For further details, write at once for AIR CONTROL'S Catalog 39A with revised list prices.

AIR CONTROL PRODUCTS, INC.
MUSKEGON MICHIGAN

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GRAVITY TYPE REGISTERS • • DAMPER CONTROL SETS



S. T. Johnson Co. announces STREAM-LINED DIRECT-AIR FIRED
AIR CONDITIONER



AEROLUX

Equipped with Johnson BH-O "Bankheat"
Pressure Type Oil Burner

Finished in baked enamel of 2-tone green, rounded corners, all working parts completely enclosed. Designed for highest capacity in a minimum of space with a large amount of heating surface which insures highest over-all efficiency.

Air is filtered, warmed and humidified, then forced to various rooms by twin blower fans driven by direct-connected multi-speed motor. Fan motor is automatically controlled by temperature control.

The AEROLUX is only one unit of a complete line of Oil Burners and Heating, Ventilating and Air Conditioning products for domestic, commercial and industrial use produced by this pioneer manufacturer.

Worthwhile territories and franchises available to aggressive dealers anxious to serve their communities with a complete line. Write today, giving details on qualifications.

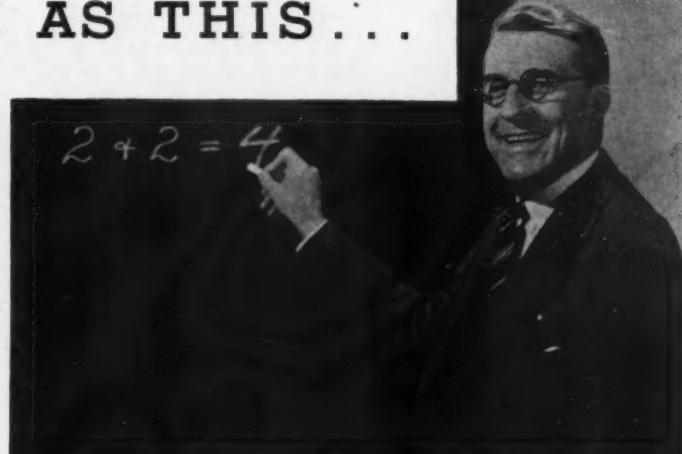
S. T. JOHNSON CO.

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401 N. BROAD STREET, PHILADELPHIA, PA.



IT IS AS SIMPLE AS THIS . . .

TO ADD MORE
PROFITS TO YOUR
HUMIDIFIER
SALES



It is as easy to add more profits to each humidifier sale you make, when you handle the SKUTTLE line, as it is to add 2 and 2. The reason for this larger margin of profit is quite obvious when you consult the trouble free operations of the patented SKUTTLE valve, an exclusive feature on every SKUTTLE AUTOMATIC HUMIDIFIER manufactured. This feature alone will save you money on service calls. Another feature of the SKUTTLE HUMIDIFIER that saves the dealer and manufacturer time and money on installation is the way it is designed, so that it can be easily installed in the plenum or bonnet chamber of any warm air furnace.

Skuttle's new type adjustable cadmium plated collar was also designed to save the dealer time when installing or replacing a ceramic unit in the humidifier pan. With this type collar, there is no need of cutting extra holes in the plenum chamber or taking the humidifier apart when ceramics are to be replaced. If you will add up these exclusive SKUTTLE features, you will readily see that it is as simple as $2 + 2 = 4$ that SKUTTLE does add profits to your humidifier sales.

The SKUTTLE HUMIDIFIER is available in 20" or 30" sizes, or any size that you may specify. Write for literature today.

WRITE TODAY FOR

J. L. SKUTTLE COMPANY

Skuttle
AUTOMATIC HUMIDIFIERS

INFORMATION

999 FRANKLIN ST., DETROIT, MICH.

National Warm Air Convention

(Continued from page 75)

combined ceiling and roof is a simpler and easier calculation than that required to calculate heat losses separately. The chart on which this discussion was based has also been published in previous issues of AMERICAN ARTISAN. According to Prof. Kratz, if one layer of insulation is to be used it is more advantageous to place the insulation on the ceiling rather than on the rafters of the attic.

Resistance of Registers

Prof. S. Konzo, discussing "Resistance of Registers and Grilles To Air Flow" explained that recently the Research Residence staff has been conducting a series of tests to establish just how much resistance is set up by different types of register faces. Prof. Konzo said that one surprising result of this series of tests is the high resistance shown by the so-called "perforated" register face with a wide border. Prof. Konzo described the "border" as the face metal between the edge of the open spaces in the face and the galvanized iron of the duct. Wide borders and small perforations with wide vertical and horizontal bars show resistances of almost 1 in. water gauge, or, as Prof. Konzo pointed out, almost as much resistance in one such register as the contractor ordinarily calculates for the entire duct system.

Another important discovery during this series of tests was the fact that deflector types of registers, where the vanes are set at about 22 deg. show a resistance of approximately .05 inches and that all vane settings sharper than 22 deg. show increasing resistance until the point where the vane is set at approximately 60 deg. deflection, when the resistance due to these vanes reaches a surprising magnitude.

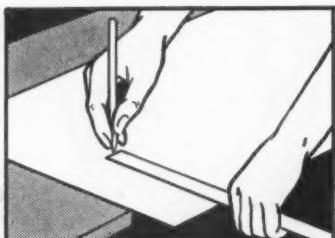
Installation Codes

B. F. McLouth, Chairman, Installation Codes Committee, reported a number of minor changes in the three industry codes. One change covers the sizing of risers leading to third floor registers in three-story structures. The controversial $\frac{1}{4}$ of a degree per foot of duct temperature drop has been changed to read from $\frac{1}{4}$ to $\frac{1}{2}$ deg. per foot of duct to cover the many velocities now in common use. A change has been made in the weight of metal required for 14-inch wide stacks to permit the use of I. C. tin or 28-gauge galvanized iron without penalizing the contractor by compelling him to go to 26-gauge for one additional inch in stack width.

A number of changes have been suggested in National Board of Fire Underwriter rulings, and if these changes are accepted and adopted by N. B. F. U., a complete report of the changes will be published. Chairman McLouth reported that approximately 6,000 codes of each of the three types were sold in 1939.

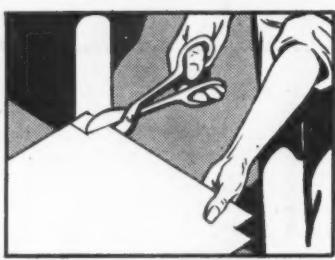
J. H. Van Alsburg, speaking on "Sizing Registers

3 Simple Steps With a LOCKFORMER



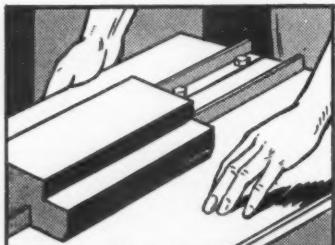
1.

Measuring and cutting Sheet to size



2.

Notching Corners



3.

Forming Lock.
(Single pass through
Machine)

will form Pittsburgh Locks in just a fraction of the time it takes by old fashioned methods. And what is more the locks are perfect. They are uniform, rigid. Pocket is always open, Hammer-over edge stays uniform regardless of notching, and is adjustable.

Duct and fittings assemble faster, easier and neater.



Supply dealers and jobbers handle LOCKFORMER Shop-Efficiency Equipment everywhere. Easy time payment terms are available.



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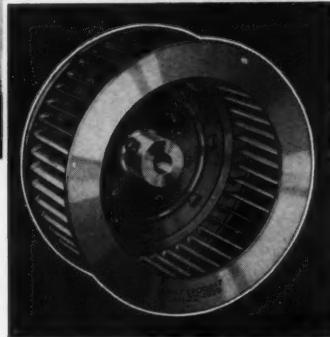
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Photo by Ewing Galloway



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The ballet dancer's perfect balance is acquired through years of work and experience. Balance in Torrington Blower Wheels is an inherent attribute acquired through long experience and highly developed skill in producing that precise structural uniformity which is essential to smooth, quiet operation. Specify Torrington Air Impellers. They will improve the efficiency of your product—and help to sell it. Blower Wheels from 3" to 16" diameters. Propeller Fan Blades from 3" to 48" diameters. Detailed specifications and guaranteed ratings available for each size.

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But we have more reasons to show a photograph of the Toridheet line. If you couldn't come to the Show we want to take part of the Show TO YOU. We want you to see a real picture of the Toridheet display... let us explain Toridheet equipment in detail... see for yourself why Toridheet is the line that will help you increase your profits... why Toridheet is the only COMPLETE line in the industry.

When do you want us to call? Send the coupon or clip it to your letterhead TODAY — tomorrow may be too late.

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SALES-ENGINEERING OFFICES IN ALL PRINCIPAL CITIES



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Every Sheet Metal Worker needs perforated metal in one form or another.

For processing food products and to withstand certain chemicals, perforated Stainless Steel and Monel Metal are much used.

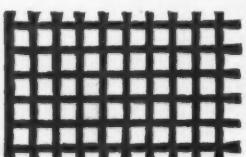
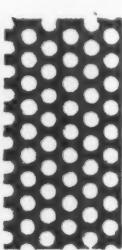
Factory Safety Guards—For this service perforated metal has no equal.

For Grilles, Radiator Enclosures, Air Conditioning Cabinets, we have many beautiful designs.

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You'll like H&K prompt, satisfying work and pleasing prices.

Perforators of metals since 1883. Send us your specifications.



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Sizing Registers for Forced Air

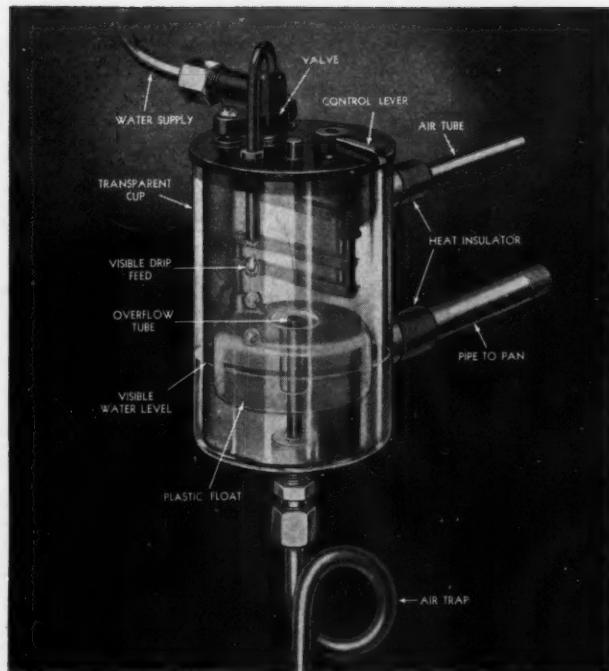
for Forced Air and Air Conditioning Installations" pointed out that the proper register location, the proper type of register, the proper size of register, are all highly important in obtaining good heating operation. Mr. Van Alsburg emphasized that an elbow of average radius equals approximately eleven pipe diameters in resistance and an elbow with an inside right angle equals approximately 52 pipe diameters; therefore an effort should be made to eliminate abrupt turns in register heads and suggested turning vanes in the stack head as a means of straightening out the air flow before the air issues from the face of the register. Mr. Van Alsburg demonstrated the effect of register faces and boxes without vanes where two-thirds of the air may issue from the upper two-thirds of the register opening; resulting in ceiling streaking and the setting up of detrimental air entrainment in front of the register. Controversy over high vs. baseboard register locations, according to Mr. Van Alsburg, continues without any final conclusions, but each register location is satisfactory if air temperature, air velocity, and air distribution are properly handled by the installer. Mr. Van Alsburg also pointed out that air volume is equally important with air velocity in determining the carrying effect of an air stream.

General Business Discussions

Two addresses particularly appropriate for 1940 and the warm air heating industry were delivered by Charles M. White, Republic Steel Company, and C. T. Burg of the Iron Fireman Manufacturing Company.

Mr. White, speaking on "The Interdependence of Industry," pointed out that advances in any one industry must be paralleled by advances in other industries contributing to the first industry if the final advancement is to be accepted. As an example, advancement in furnace design and present day operation of furnaces at higher temperatures under automatic firing must be paralleled by advances in steel making in order that the material used will not fail under the imposed conditions.

Furthermore, modern residential construction employs steel in ever increasing quantities as for example steel windows, steel lath, steel equipment, steel stoves and utensils, steel refrigerators and storage cabinets in addition to the furnace with which this particular industry is concerned. According to the speaker the prefabricated steel house is bound to come and this prefabricated steel house will bring increased employment and will provide the home owner with a better house at a lower price. Mr. White declared that he, personally, feels that the Federal government program to place employment on a reform basis rather than upon the foundation of stable employment in the future is a mistake. Also, whereas formerly all government—federal, state or local—adjusted its facilities to the needs of the community today all government, whether federal, state or local, is establishing itself as the leader in social and economic trends, thereby



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A New High In Float Control

Non-Liming operation. Will operate perfectly in water so loaded with lime that no other float control can function.

Corrosion Proof. Chrome nickel mechanism, die molded polystyrene cup completely proof against any acid or alkali occurring in any water.

Adjustable Feed Rate. To control evaporation rate and humidity to exactly meet owner's needs.

Rugged Construction. Reinforced at all points where strains might be imposed during installation. Ample safety factors provided throughout.

For complete information, write:

MONMOUTH PRODUCTS, INC.
1933 E. 61st St. Cleveland, Ohio

MONMOUTH
The Greatest Name in Humidification

SPECIALIZE WITH ARC WELDING

is Mr. Bain's tip on how to get more business and lower costs

Mr. Bain, Prop. of Bain Sheet Metal Shop, Tulsa, Okla. is shown here with one of his lines of arc welded specialties—machine guards. They're made to order from black iron by simply cutting, forming and welding. Mr. Bain does the welding himself using a 100-amp. Lincoln "Shield-Arc Jr."

Other specialties include signs (angle iron backed up and welded around the edges of galvanized sheets), canopies, pans, oil well mud sampling machines and factory equipment. These special lines bring exceptionally good profits and level off the valleys of business volume.

Cash in on arc welding with the New "Shield-Arc Jr." Welder. Its *direct current* and exacting control give you an arc that's easy to handle on all metals and alloys. Work is speedy. Results are dependable. Available in ratings of 75, 100, 150 and 200 amperes. Consult the nearest Lincoln office or mail the coupon for details. **THE LINCOLN ELECTRIC CO., Cleveland, Ohio.** Largest Manufacturers of Arc Welding Equipment in the World.

NEW "Shield-Arc Junior" Welder with Self-Indicating "Job Selector" and Current Control. Provides the right TYPE and INTENSITY of arc for lowest cost on every job.



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Dept. EE-4, Cleveland, Ohio**
Send free information on sheet metal welding with bulletin on new "Shield-Arc Junior."

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Company _____

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City _____ State _____



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MAGIC TELL-TALE

BRILLIANT HAMMERLOID FINISH

A COMPLETE LINE

MORE DEALER HELPS



Oil-Fired Airconditioner
Gas-Fired



With Magic Hand Controls . . . with the "Magic Tell-Tale" . . . with "Automatic Air" . . . with a brand new finish of brilliant green "Hammerloid." With appeal for the eye, the purse and for comfort Conco again leads in "sales-ability" and in "profit-ability." With Conco sales up 80% in 1939, our dealers are looking toward even greater sales . . . greater profits in 1940. For the Conco line is now complete — coal, oil and gas-fired heating and conditioning equipment. Write or wire today for additional facts.

CONCO CORPORATION

Automatic Packaged Heat

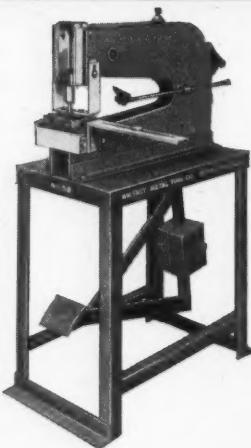
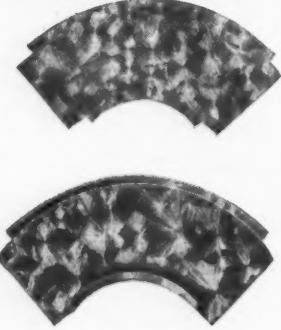
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can be blanked and formed cheaply on a

No. 58 FOOT PRESS

25 YEARS



SHEET
METAL
TOOLS

Note: Above illustration of No. 58 Foot Press does not show Elbow Cheek blanking and forming dies.

- Substantial savings can be effected in the making of duct elbows by cutting out and edging the cheeks on a No. 58 Foot Press equipped with special blanking and forming dies, producing completed cheeks in two quick and easy operations. Write for further information.

WHITNEY METAL TOOL CO. • 91 Forbes Street, Rockford, Illinois

causing business and society to follow the lead of government. Under present restrictions the employer can not talk to his employee, business can not finance itself without much red tape and supervision, every move on the part of business no matter how trivial, calls for consultation with lawyers and tax experts. The solution to these difficulties, declared Mr. White, must lie in an awakening of business men to the need for reform in government and the placing of government in its proper position as a service to the public rather than in the reverse order.

The Three Bogeymen

C. T. Burg, one of the recognized business speakers of the present decade, presented an address called "The Three Bogeymen." These three bogeymen of business are Inertia, Pessimism, and Delay. According to Mr. Burg the basis for all business success lies in enthusiasm, hard work and a willingness to tell the businessman's story any time, any place, to anyone. So far as the warm air heating industry is concerned, Mr. Burg suggested that if this industry can get the public to talk about inside weather instead of outside weather, this industry will have a real production problem. The speaker emphasized that in the warm air heating industry every cold winter has been followed by a big business year.

One pertinent sales suggestion offered by the speaker was to the effect that if the salesman thinks the prospect says "Know" instead of "No" and takes the occasion to explain again, in detail, the things the customer should know, instead of folding up the brief case and silently slipping away, sales all along the line would increase. These three bogeymen can be licked only by adequate antecedents which are—Work for Inertia; Enthusiasm for Pessimism; and a Do It Now for Delay.

From his many years as a sales executive, Mr. Burg pointed out that one pessimist in an organization is a greater handicap to sales than any other single cause. The worst pessimist, very often, is the boss himself and how the boss feels and acts, so feels and acts the salesmen under him.

Perl S. Miller, reporting on the standardization committee, announced some advances in the elimination of specials in sizes of furnaces, fittings and accessories have been made by the committee and that further progress is anticipated during 1940. The Committee has set up standard items in all lines on printed forms and these forms are or will be mailed to all manufacturers with the hope that manufacturers will revamp their lines to adhere to the standard items and eliminate all specials. When these returns have been received, the next step will be to have the Bureau of Standards prepare its recommendation and submit these to the industry.

It was announced that the June meeting of the National Warm Air Heating & Air Conditioning Association will be held in Chicago.

At the joint session of the American Society of Heating & Ventilating Engineers and the National Warm Air Heating & Air Conditioning Association, W. L. Fleisher of the American Society presented



*For Dependable
Operation—*

BARBER Gas Pressure REGULATORS

Certified by A.G.A.
Testing Laboratory.
Sizes $\frac{1}{4}$ " up.

There is no such thing as a *pretty good* gas pressure regulator. On a control device so essential for safety and economy you simply *must* have dependable performance. Your regulator must respond like the muscles of a trained athlete. Barber Regulators are built that way. They are sensitive to minute pressure variations. Carefully constructed of the best materials, Barber Regulators are also styled in conformance with modern gas appliance design. Bodies are all bronze, working parts of brass, springs of phosphor bronze, diaphragm of selected sheepskin. Moderately priced, Barber is today's finest regulator value.

Write for complete literature, prices and discounts on the entire line of Conversion Burners, Appliance Burners, Controls and Regulators.

THE BARBER GAS BURNER CO.
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Send it Sailor!

USAIRCO NEW SUPER BLOWER-FILTER UNIT.. IS IMPORTANT VALUE

See the Extras you get!

The floor is insulated, sound, water and leak proof. Two access doors make it easier to install and service — gives greater capacity for summer cooling. Air tight cabinet. Air tight filter locking device prevents dust leakage. Greater filter area. Nationally known vari-speed motor and furnace stat. Forwardly curved, centrifugal type blower insulated from cabinet. Quiet, noiseless, efficient. Write for complete details and prices of the biggest value in the U.S.A.



Write for special data
on wheels, housings and
light duty assemblies.

UNITED STATES AIR CONDITIONING CORP.
NORTHWEST TERMINAL
MINNEAPOLIS, MINNESOTA, U. S. A.

"Williamson Line Best On Market Today"

"The Williamson Heater Company:

I am a new dealer in your company. Last year was my first year. I did only a fair amount of business but made a lot of friends and prospects and expect to do a good business this year. I could not do this if I did not have the Williamson Line to work with.

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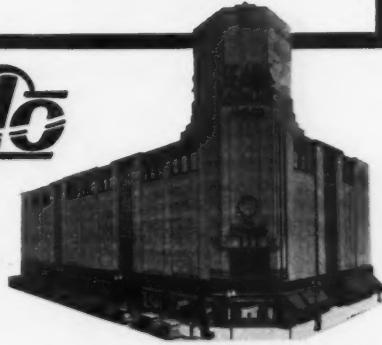
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Engineer: M. C. Schwab. Air Conditioning Engineer:
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a brief resume of some of the fundamental research conducted by the American Society.

Frank L. Meyer presented a similar resume of basic research activities by the National Warm Air Heating & Air Conditioning Association.

At this same joint session, Professors A. P. Kratz and S. Konzo discussed the performance of stoker-fired warm air furnaces as effected by the burning rate and feed rate, bringing up to date the paper previously presented and published in the February-March, 1939, issues of AMERICAN ARTISAN.

In addition to the business session, splendid entertainment was provided for both the associations. There was a joint smoker for the ASH&VE and the National Warm Air meeting given by the American Society; there was another smoker and entertainment for men only, given by the National Warm Air Association inviting the American Society. The Republic Steel Mill furnished the members of both the societies with free trips through the new strip mill and a limited number of guests were invited to go through the new rayon plant at Painesville, Ohio.

Illinois Convention

(Continued from page 79)

department and the service man as a necessary evil. The truth of the matter, according to Mr. Lavorgna, is that the service department probably contacts the customer many more times during a year than does

the contractor and, therefore, the service mechanic should be presentable, clean, pleasant, careful, and should know his business from A to Z.

Not only should the service mechanics understand the common problems of adjustment, but he also should be able to analyze the general engineering design of the system in order to determine whether or not the engineering design is at fault insofar as the particular complaint is concerned. The speaker pointed out some of the common causes of complaint such as cold areas within rooms, but little or too much air movement within spaces heated, improper operation of the control mechanism, improper combustion or inadequate operating cycles—all of which mean that the service man must be an engineer as well as a mechanic.

Oil Burner Service

A very instructive technical discussion on servicing oil burners and oil-burner control systems was presented by John Wallis, Engineer, The Meyer Furnace Company. Mr. Wallis pointed out that many customers expect the installation of an oil burner to permanently solve all of the previous troubles—which an oil burner cannot possibly do—and which the contractor should do his utmost to explain honestly. If certain rooms do not heat, if air movement is not satisfactory in certain areas, the installation of an oil burner will not remedy these conditions.

The causes of such complaints are basic problems.

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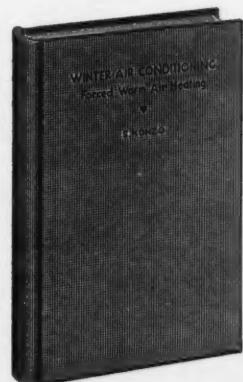
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Length—26½ inches. Capacity—⅜-inch hole through ¼-inch iron; ⅜-inch hole through ⅜-inch iron; ⅔-inch hole through ⅔-inch iron. Depth throat, 5 inches. Weight, 82 lbs.	CAPACITY ⅜-inch hole through ¼-inch iron; ⅜-inch hole through ⅜-inch iron; ⅔-inch hole through ⅔-inch iron. Depth throat, 5 inches. Weight, 82 lbs.	CHANNEL IRON PUNCH
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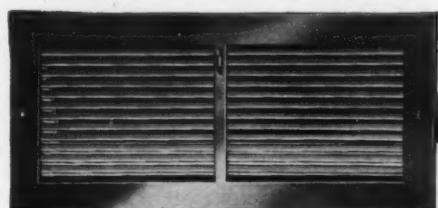
by S. KONZO
Research Assistant Professor
University of Illinois

Embodied in this 532 page volume is the complete record and explanation of the results of the forced air heating studies carried out in the Research Residence at the University of Illinois. It is filled with basic information that heating men everywhere will find invaluable as a guide to correct and up-to-date practice in the design and installation of forced air heating and residential air conditioning systems. WINTER AIR CONDITIONING belongs in the hands of everyone interested in or doing residential air conditioning work. As this book has been published by the National Warm Air Heating and Air Conditioning Association to make its invaluable data readily available to all it is offered to the industry at the low non-profit price of only \$3.00 per copy. To obtain this book promptly, send your order and remittance today to the address below.

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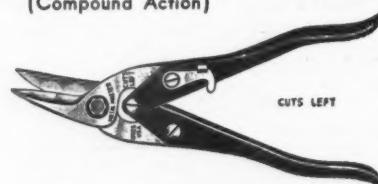
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Improper operation of the oil burner, insufficient transfer of heat, carbonizing of the burner and the electrodes, sooty flames, delayed ignition—all of which are very common service problems—arise primarily from improper sizing and improper design of combustion chambers. Mr. Wallis explained just how combustion chambers should be sized, what the shape should be, how the size and shape of the furnace affects the size and shape of the combustion chamber and gave some practical rules of thumb for judging the proper combustion chamber design.

From personal experience, Mr. Wallis suggested that the smallest nozzle used should be 1 gallon capacity; that the combustion chamber should have a floor area of 100 sq. inches for each gallon of oil burned; that where a corbel is installed, the opening above the corbel should be at least 85 sq. inches for each gallon of oil burned; the brick of the combustion chamber should be laid neatly, the joints should be troweled smooth and the face of the brick should be slick and rough plaster marks should be eliminated because all roughness in combustion chamber surfaces result in smoky flames and the deposit of soot. Last the air tube should be tightly sealed against air leakage; thermostats should not be installed in the easiest room to heat nor adjacent to warm air registers nor in little used areas of the house or cold hallways, but should be installed in the room of greatest service or the room requiring approximately the largest input of heat. Somewhere between 9 and 10 per cent CO_2 with a draft over the fire of .02 inches by draft gauge give a slightly yellow flame with just a trace of smoke at the tips which indicates good combustion and a stable combustion period.

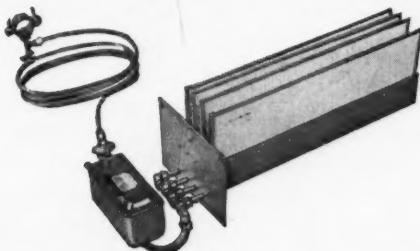
Procedure for Balancing System

Also of interest was the technical discussion presented by A. W. Ryba, Sales Engineer, American Radiator and Standard Sanitary Corp., who explained the method of balancing and checking systems which is used by his service department. Mr. Ryba declared that the entire procedure is based upon the use of a kit of tools, like a physician's kit of equipment, containing two thermometers registering from 20 to 220 deg. F., one sling psychrometer, one velometer and some standardized charts on which records of performance are entered.

The balancing and checking procedure saves much time and very briefly follows this procedure—On receiving a complaint, the service man visits the job and asks the customer for a complete outline of the complaint. Then using a sling psychrometer, temperature readings are taken in each room, these readings are recorded upon the chart. After making the first set of temperature readings for all rooms, the service man then goes to the basement and watches the system through one cycle of operation where the automatic firing device operates and the blower runs and checks this equipment to see that it is functioning properly. He also checks the control equipment to see that the control sequence is according to preliminary design.

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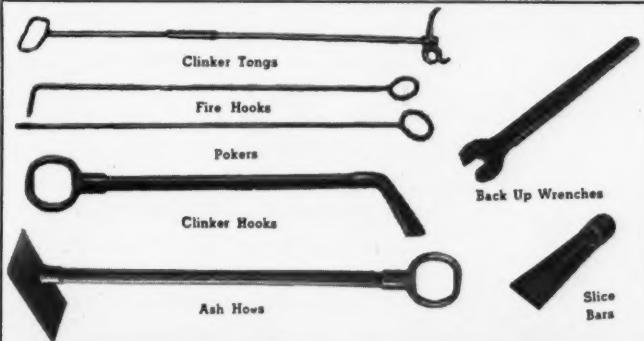
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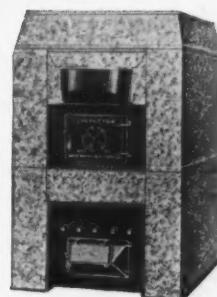
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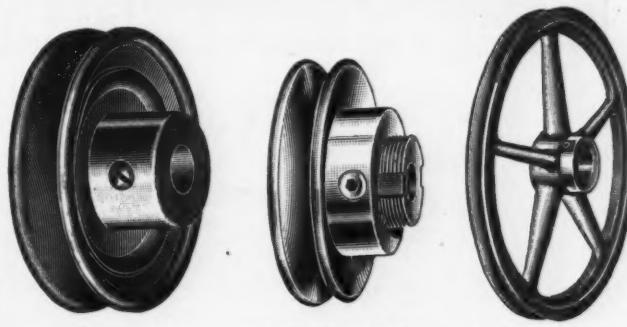
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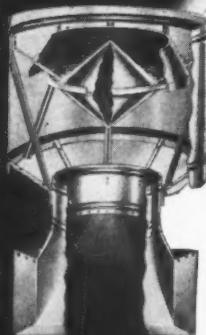
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Then the service man goes back up stairs and takes another complete set of room temperature readings with the sling psychrometer to see that temperatures are somewhat in line just after an operating cycle of the unit. Then the service man asks the customer to accompany him while he makes a velometer reading of air flow at each register in the house. These air-flow records are entered on the chart and are then compared with the original cfm requirements for the installation. Rooms which do not have sufficient air volume and rooms which have too much air volume are noted and the service man then adjusts dampers in the basement beginning at the furnace and working to the farthest run. Sometimes one and oftentimes two checks for air volume are required before the system is balanced. After the system is balanced, all rooms are again checked with the sling psychrometer for temperature readings and these final readings are entered on the chart.

If there still remains some discrepancies in temperature, one thermometer is placed in the register of the warmest room and one thermometer is placed in the register of the coldest room, and the temperature drop through the duct system is recorded. If this temperature drop can be compensated for by still further increasing air delivery, this is done at this time. All the while the customer is invited to consult the records as entered and when the system is finally balanced and all rooms brought up to temperature, the customer finds it pretty difficult to complain further about the same causes.

Mr. Ryba said that as a result of their experience, his organization recommends that the rooms in which the thermostat is located should be balanced for a temperature approximately 1 deg. below the temperature of other rooms so that the thermostat room will always require heat just a little before the other rooms of the house. The complete kit of equipment previously described should cost the contractor from \$60 to \$75 and, according to the speaker, will very quickly repay for the cost.

In the way of entertainment, the entire convention was invited to make an inspection trip of the Hiram Walker Distillery (with samples). A smoker and floor show was given by manufacturers and jobbers and the annual banquet was held on the final evening at which a very entertaining floor show with music was presented by the auxiliary for the pleasure of the sheet metal contractors.

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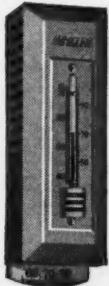
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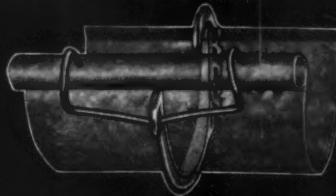


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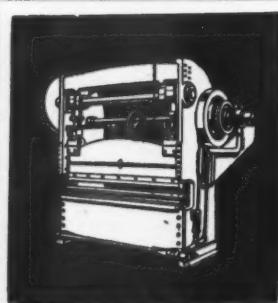
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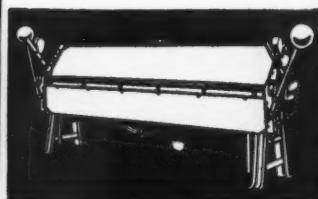
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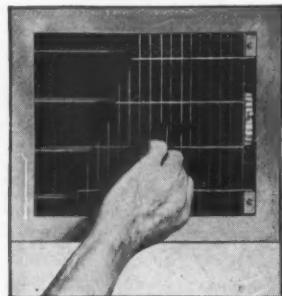
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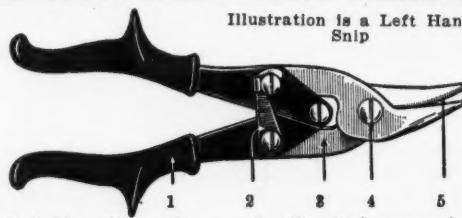
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Chicago

13c $\frac{1}{4}$ " RIBBED WIRE GLASS
Per Sq. Ft.—Plus Boxing
F. O. B. Our Warehouse
STOCK SHEETS—CASE LOTS
Reasonable freight rates to all parts of U. S. A.
Salesmen wanted for several territories.
Cut sizes—2x per sq. ft. additional.
PROMPT SHIPMENT—GOOD QUALITY
T. J. ATCHESON GLASS COMPANY
955 Main Street
Buffalo, N. Y., U. S. A.



Manufacturers Agents

MANUFACTURERS WANTING ADDITIONAL representation often come to us for names of prospective agents now handling other lines in this field on a commission basis in a definite territory. It will pay you to be on record with us so we can refer your name to interested manufacturers. No charge or obligation, of course. It is a service we render free to manufacturers and representative. Just drop a line that you are interested in being on file and we will send you form to fill out. Address American Artisan, 6 N. Michigan Ave., Chicago, Ill.



UTILITY BENDING BRAKE

A one man portable bending brake that will do all bending work on an ordinary forced air job. Weighs 70 lbs. complete. One man can turn out finished work on air conditioning installations with no lost time, misfits or spoiled material. Write today for further information.

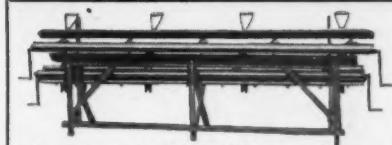
A. R. HARRIS
4548 Hohman Ave.
Hammond, Ind.

QUALITY REPAIR PARTS for all makes of FURNACES AND BOILERS

PROMPT SERVICE

• Free Catalog to Trade •

SHAMBLEN
FURNACE PARTS CO.
Pittsburgh, Pa.



The Electric City Gutter Former

MAKE YOUR OWN GUTTER AS YOU WANT IT
Easily and quickly operated. Soon pays for itself.

REPLACEMENTS
Bending Rods, Handles, Rolls, etc., quickly furnished.

STERLING BEADER
A simple and inexpensive machine for forming round bead.

F. L. ROBERTSON
56 RANO STREET BUFFALO, N. Y.

CUSTOM FABRICATION OF ALL ALLOYS STAINLESS-MONEL-COPPER, ETC.

Custom fabrication of all alloys with satisfaction guaranteed. Send blueprints for prices and delivery. Years of experience guarantee responsible and accurate work. TERMS CASH WITH ORDER. Write today for further information.

RIESTER & THESMACHER COMPANY
SHEET METAL PRODUCTS
1526 W. 25th St., Cleveland, O.

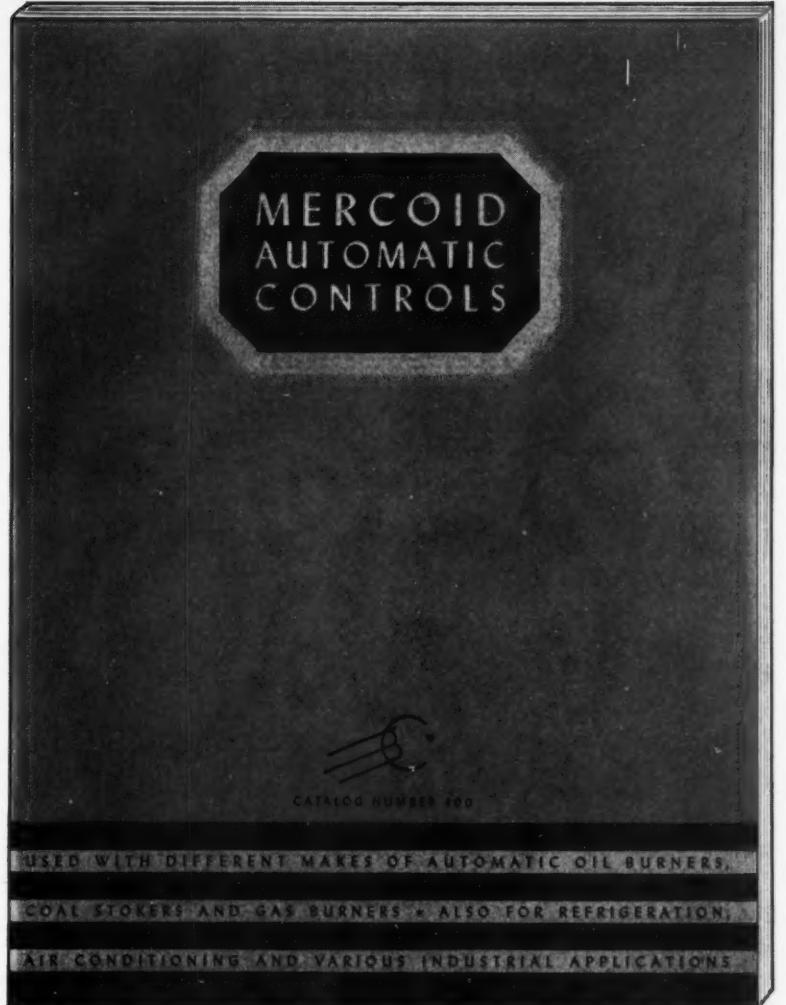
SERVICE SECTION: Rates for display space similar to above in Service Section are \$5.00 per inch per insertion. One-inch minimum space accepted. **Classified Section:** Rates for classified advertising are 5 cents for each word including heading and address. Count seven words for keyed address. Minimum \$1.00 for each insertion. Cash must accompany order.

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Firms represented in this issue are identified by the folio of the page on which their advertising appears. Advertising which appears in other issues is marked with an asterisk.

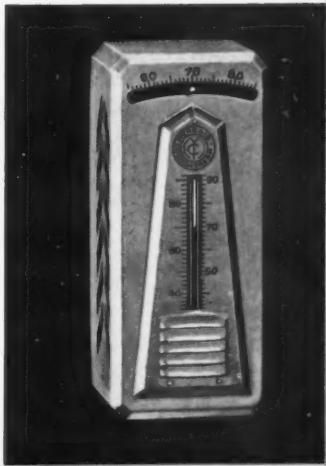


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M * E * R * C * O * I * D NEW CATALOG No. 400A

IF YOU USE AUTOMATIC CONTROLS, YOU WILL NEED THE INFORMATION CONTAINED THEREIN. MERCOID CONTROLS WILL NEVER LET YOU DOWN ON ANY OF YOUR JOBS. THE CATALOG IS YOURS FOR THE ASKING.
THE MERCOID CORPORATION • 4201 BELMONT AVENUE • CHICAGO, ILLINOIS



MERCOID SENSAITHERM

THE IDEAL ROOM THERMOSTAT

*** FOR * COMPLETE * INFORMATION**

THE MERCOID CORPORATION • 4201 BELMONT AVE. • CHICAGO, ILL.

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PLEASE CHECK WHETHER YOU ARE—

DEALER JOBBER MANUFACTURER

TYPE M-53 FAN CONTROL

A LEADER IN THE WARM AIR FIELD

CONSULT * CATALOG



WHETHER YOU SELL THE HOUSEWIFE or the HUSBAND

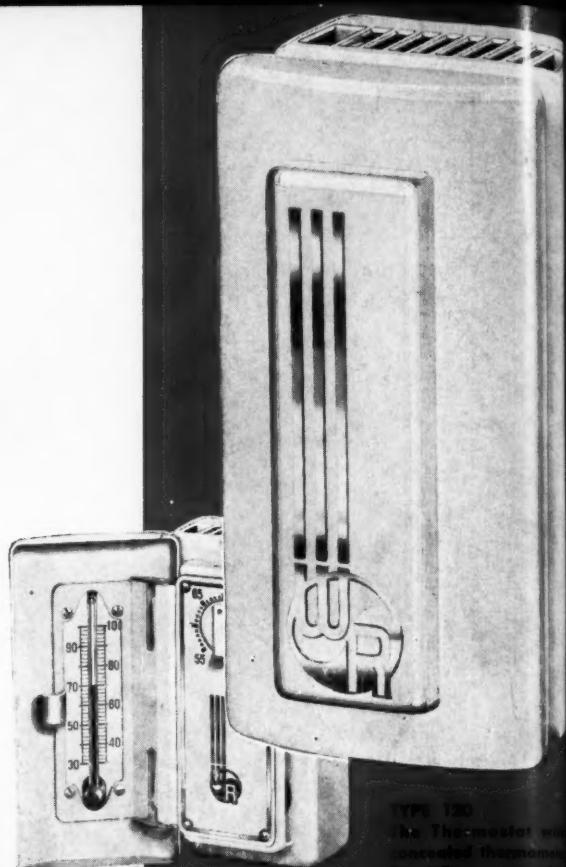
Hydraulic Action CONTROLS

HELP YOU GET THE JOB

Beauty

The housewife wants an attractive thermostat. She expects accuracy but she also wants an instrument that harmonizes with her home furnishings. It must be inconspicuous in appearance, but always handy to use.

By offering the attractive White-Rodgers Room Thermostat with their equipment, warm air furnace dealers are taking advantage of this desire. The beauty of the thermostat often swings those close sales their way.

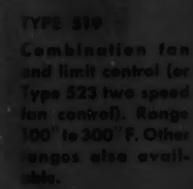


TYPE 720
The Thermostat with concealed thermometer. Touch Temperature Adjustment.

TYPE 726
Magnetic Relay Stoker Timer with line switch. For night set-back service.



TYPE 7910
3/4-inch electric diaphragm gas valve. Available 3/4 inch to 1 1/2 inch actuated. Compact.



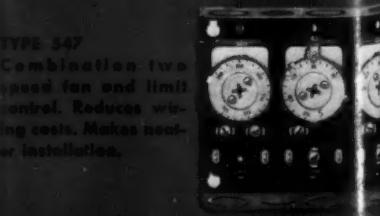
TYPE 519
Combination fan and limit control (or Type 523 two speed fan control). Range 100° to 300° F. Other ranges also available.



TYPE 513
Single speed gas valve. Type 408 limit control. Range 100° to 300° F. Other ranges also available.



TYPE 547
Combination two speed fan and limit control. Reduces wiring costs. Makes neat easier installation.



Dependability

You must convince the man of the home that he is investing in control equipment that will give dependable, trouble-free service for many years.

You can convince him of this! Stress the long-life and constant operation of White-Rodgers limit and fan controls — the service-free performance of gas-actuated diaphragm gas valves — the uniformly dependable stoker timer.

There must be a reason for the rapidly growing popularity of White-Rodgers controls. Why not find out for yourself ALL the reasons? Send for free condensed heating catalog today.

WHITE-RODGERS ELECTRIC CO.

1215 CASS
AVENUE



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